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A METHOD
FOR
THE IDENTIFICATION OF PURE ORGANIC COMPOUNDS

BY A SYSTEMATIC ANALYTICAL PROCEDURE BASED ON PHYSICAL PROPERTIES AND CHEMICAL REACTIONS

VOL. IV

CONTAINING CLASSIFIED DESCRIPTIONS
OF ABOUT 3700 OF THE MORE IMPORTANT COMPOUNDS
BELONGING TO FOURTEEN OF THE HIGHER ORDERS

BY

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PREFACE

With the publication of this volume the most important portions of the special analytical field with which the " Method " is concerned are so far covered that the chemist who is engaged in the indentification of any well characterized, pure organic compound may turn to its tables with at least a reasonable hope of assistance in the solution of his problem, provided the compound has been previously described and possesses some apparent general interest.

Volume IV adds to the " Method " fourteen " orders " or groups of compounds containing new combinations of elementary atoms, and about 3900 additional specific characterizations to the previously completed descriptions. The selection of compounds is the result of a scrutiny of the entire list of compounds mentioned in the last completed edition of Beilstein's " Handbuch " and of the first three volumes of the edition now in progress of publication, and also includes many other species of evident interest described in the more recent periodical literature. No radical departures from the earlier plan for treating the subject matter was found necessary, except that the increased difficulty in securing a sufficiently large number of pure representatives of the compounds of mixed chemical types in the " higher orders " has rendered it temporarily inexpedient to attempt so extensive a subdivision into formal lower groups as in the earlier orders.

It is evident that the rapid multiplication of known organic compounds and of methods for differentiating between them necessitates the careful periodical revision and extension of any body of analytical descriptions that will long satisfy practical requirements. The insertion of the corrections that are naturally made before each reprinting is not enough. In the case of the " Method " it is believed that the desired evolution may be best effected, and with least expense to the public, by next preparing at an early date a supplementary volume that will contain many new procedures and descriptions closely coördinated with the contents of the existing volumes, and probably accompanied by tables for a few of the lesser orders which still remain to be arranged.

Finally, it is again a pleasure for the author to acknowledge his grateful appreciation for the kindly coöperation of his students, colleagues, and publishers during the progress of this part of his work, and for the opportunities and facilities supplied by the Massachusetts Institute of Technology that rendered its execution possible.

S. P. M.

Massachusetts Institute of Technology, 1922.

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ABBREVIATIONS AND SIGNS

The numerous abbreviations and signs employed in this volume are in general identical with those explained in the "Table of Abbreviations" on pages vii–ix of Volume II. The only noteworthy innovations consist in the use of the abbreviation ⟨ G.O. — ⟩, explained in a footnote on page 3, and the variable significance of the typographical signs ⟨*⟩, ⟨†⟩, ⟨‡⟩, ⟨§⟩, ⟨**⟩ in tabulated characterizations, explanation of the latter signs being supplied in foot-notes or under "General Observations" of the "Section" or "Order" in which they occur.

A METHOD FOR THE IDENTIFICATION OF PURE ORGANIC COMPOUNDS

CHAPTER I

CLASSIFICATION AND GENERAL PROCEDURE IN THE HIGHER ORDERS

If the number of compounds of carbon requiring analytical characterization in the higher orders of this work were limited only by the number of their constituent elements and the mathematical laws of permutations and combinations, this portion of the "Method" would have the dimensions of a library rather than of a volume. Actually, the number of species that have been sufficiently well characterized by chemists to enable reidentification through existing descriptions, and which are likely to fall occasionally into the hands of the analyst because of their occurrence in technical products, or because of their ready formation in reactions between common materials, is much smaller than might be anticipated from the crowded condition of the Tables in Orders I and II. This accident has made it practicable to arrange serviceable analytical tables for the higher orders with fewer formal subordinal divisions than were considered necessary in the lower ones. As has been remarked in the "Preface," a further subdivision giving greater prominence to generic distinctions will doubtless be advantageous later when essential experimental data at present lacking have been supplied.

Volume I provided for the compounds of Order I, containing the elements carbon, hydrogen and oxygen.

Volume II covers the compounds of Order II, containing the element nitrogen, in addition to the elements of Order I.

The " higher orders " forming the subject matter of Volume IV are made up of species containing combinations of the elements which are not described in Volumes I and II. These combinations are shown by the " Index For The Higher Orders " below. The phrase " *Additional Elements* " in this Table signifies elements present in the compounds of an order in addition to carbon, which occurs in all organic compounds, and in addition to hydrogen and oxygen, which occur as components of a majority of the species of all orders. The sequence in which " additional elements " appear in the list is that proposed by Richter, in his Lexikon der Kohlenstoff Verbindungen. The expression " (A–Z) " as used in this Index signifies any one of the many elements following arsenic in the Richterian sequence. Many of the "higher orders" contain no known species, or none of present general interest; but enough ordinal numbers have been reserved for future orders to permit an almost indefinite future extension of the system. The numbers of orders described in this edition of Volume IV are printed in large, bold-faced type. The numbers of orders not yet provided for are printed in a smaller and lighter type.

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"Additional Elements"	Ordinal No.	Page No. in Vol. IV.
(One additional element)		
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DIRECTIONS FOR THE GENERAL PROCEDURE TO BE FOLLOWED IN THE IDENTIFICATION OF AN UNKNOWN COMPOUND IN THE HIGHER ORDERS

Conforming to the usage established in earlier volumes, it is necessary at this point to indicate in general terms by numbered paragraphs in bold-faced type the successive steps of the regular procedure through which the identification of any compound described in these pages should be reached, it being assumed that the reader has first familiarized himself with the classification adopted for the "higher orders," by reading the introductory paragraphs of the present chapter.

1. DETERMINATION OF PURITY

Establish a presumption that the unknown substance is really a pure compound before attempting to identify it. If it is not homogeneous, purify it. The constituents of an unknown organic mixture can not be satisfactorily identified previous to their separation.

The criteria for chemical homogeneity and the problem of dealing with mixtures are discussed under the caption " Purity " on pp. 3–4, Vol. I.

2. DETERMINATION OF PHYSICAL PROPERTIES

Determine the color (in terms of the color standard accompanying Vol. I), the odor, and often taste (with extreme caution), the approximate solubility, in water at least, and any other salient physical characteristics of the substance. If it is solid, determine its melting-point; if a liquid, its boiling-point and its specific gravity. Make these determinations by the methods recommended under the caption " Physical Properties " on page 4 of Volume I.

3. DETERMINATION OF ORDER

Determine the Order of the compound by applying the ordinal tests of Volume I, Chapter II, as modified by the statement on pages 3 and 4 of Volume II. The number of the order corresponding to any particular combination of elements, and the place in this work where its species are described, may then be found by reference to the " Index-List of the Higher Orders " on page 2.

4. LOCATION OF A SPECIES IN THE TABLES OF VOLUME IV

First: If the compound is not a salt, turn to the chapter devoted to its order and read the introductory paragraphs entitled " General Observations."* These provide information concerning any formal subdivisions in the " Analytical Tables " of the order, and give general suggestions as to the use of the "Numbered Tests "† of Chapter II in differentiating between its genera and species. [Before proceeding further read the " Remark on Organic Salts in the Higher Orders " which follows.]

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* Such " General Observations " are referred to in the analytical tables by the abbreviation "G.O." Thus, (G.O.-A), signifies " General Observation A " *of the chapter in whose tables it is cited.*

† Such " Numbered Tests " are referred to in the analytical tables by the abbreviation "T. 4." Thus, (T. 4.10), is a reference to Numbered Test 10 of Vol. IV.

Second: Turn to the proper "Division" and "Section" of the "Analytical Tables" and compare the properties and reactions of the compound with those of all species within its subdivision that melt or boil within 5° to 15° of its observed melting- or boiling-point.

Finally: Proceed according to the context.

REMARK ON ORGANIC SALTS IN THE HIGHER ORDERS

Since the salts of metals with the organic acids, and those of the organic bases with either the organic or inorganic acids seldom receive description in the analytical tables as distinct chemical species, their identification usually involves the isolation and examination of both their acidic and basic components by appropriate special methods. Three cases of frequent occurrence are so important as to demand special notice at this point in the "General Procedure."

(a) **Salts of Nitrogen Bases.** — Every unknown compound containing nitrogen should be examined by Test 4.4a (boiling with alkali); and if the indications of this test are not negative, should then be further examined as directed in Test 4.15 for ammonium and substituted ammonium salts.

(b) **Chlorides, Bromides, Iodides, and Sulphates of Organic Bases.** — Every unknown nitrogen compound containing a halogen, besides being tested for basic salt-forming complexes as directed above under (a), should also be examined by Test 4.6 (test for halide salts of organic bases); and, if sulphur is present, with dilute hydrochloric acid and barium chloride for the SO_4^{++} ion.

(c) **Metallic Salts of Organic Acids.** — If an unknown organic compound contains a metallic element and may be a salt, the attempt to isolate and examine its acid must be made. Some of the most common procedures for this purpose are: — precipitation of an insoluble acid from the solution of a soluble salt by adding hydrochloric or sulphuric acid to its solution; liberating the acid, when soluble in water, by a stronger mineral acid and extracting the solution directly or after concentration with a volatile solvent, or, when the organic acid is volatile, separating it by distillation; removal of the metal of a salt as an insoluble compound, as in the exact precipitation of barium by sulphuric acid as barium sulphate, or in the precipitation of lead from a lead salt by hydrogen sulphide.

Metallic salts containing sulphur if not found to be sulphates should always be examined by Test 4.8 (the fusion with alkali). When this test indicates that the compound may be a sulphonate, the probability is not large that its free acid can be readily isolated and identified through existing descriptions based on physical properties. A more generally promising alternative is to treat the salt with phosphorus pentachloride and attempt to identify the acid chloride or amide derivatives as described in Tests 4.10, 4.11, and 4.12.

5. COMPLETION OF THE IDENTIFICATION

Do not regard any identification satisfactory and complete on the evidence of coincidences in properties and reactions to which attention may be called by the tables without pausing to consider whether the suggested result is consistent with all known circumstances, or without due independent criticism of the cited data. Additional, properly selected, confirmatory evidence will often be required. (In this connection read the following remarks on "Criticism and Interpretation of Analytical Evidence.")

THE CRITICISM AND INTERPRETATION OF ANALYTICAL EVIDENCE

To accept an identification on inadequate evidence, because the result chances to harmonize with some preconceived hypothesis, is always a dangerous temptation.

The accident of agreement between a few properties of a compound and those given for a particular species in tabulated descriptions — especially in orders that are not systematically subdivided by stated generic and other subdivisional tests — does not necessarily suffice for identification beyond a reasonable doubt. It may be merely a clue calling for the application of further physical and chemical tests suggested by a study of the assumed chemical structure of the compound and additional information secured by examination of its original literature.

With compounds of any except very low molecular weight remember that there must be numerous isomers and homologues, partly untabulated, and partly unknown, that differ only very slightly in properties and percentage composition from the tabulated species. With compounds of very high molecular weight this fact usually renders complete identification impossible by any procedure unless the compound has been obtained by a series of known synthetic steps.

In identifications of importance make it a rule not to accept existing descriptions of compounds as *necessarily* accurate, merely because they have been published or cited by a reputable authority. Whenever possible the original publication should be examined critically for internal evidences of reliability or error, and a pure preparation of the compound which it is supposed corresponds with the " unknown " should be secured for making a series of direct comparative tests. These tests, in the case of solids, should include a mixed melting-point determination (T. 4.17).

Errors in published descriptions arising from the use of imperfectly purified compounds, faulty ultimate analyses and determinations of physical constants, and from mistakes in the transcription of data and proof-reading are, unfortunately, of very common occurrence. Even when an analysis has been faultlessly made and its numerical data correctly stated an erroneous empirical formula may be deduced from it in the same publication. Such gross errors are known to have escaped detection for long periods, and owing to human fallibility will never be entirely eliminated from the voluminous records of chemical research. Scanty descriptions based on the work of a single authority and a single preparation require special caution in acceptance.

Always make full use of any information at hand concerning the origin and history of a compound. To undervalue such evidence is to accept an unnecessary handicap. Even an incomplete acquaintance with the materials and reactions that have led to the production of a substance, or of the treatments to which it has been subjected, or of practical uses to which it is put, deserve serious consideration. Such collateral information may quickly eliminate previously plausible hypotheses or furnish the lacking clue with less effort and greater certainty than a long series of more pretentious tests and measurements.

If identification is not secured after carefully applying the prescribed procedure of this " Method," it will be best to determine the empirical formula of the compound by the methods of ultimate analysis without an undue expenditure of time in random qualitative testing. Similarly, if one begins the attempt at identification by the procedure of the "method of the empirical formula" and success is not readily secured, prompt recourse should be had to the method of the procedure based on properties and reactions. Either of these procedures alone may lead to an *impasse*, when success would be easy if it were supplemented by the other.

CHAPTER II

NUMBERED TESTS OF VOLUME IV

The " Numbered Tests " of Volume IV are a collection of directions or suggestions for experimental procedures to which frequent reference will be made in the Analytical Tables of the "Higher Orders." Their purpose is the same as that of the corresponding " Numbered Tests " of Order II in Volume II. In citations they are introduced by the expression T. **4**., the numeral 4 being printed in bold faced type. Thus, T. **4**.10, signifies Numbered Test 10 of Volume IV. References to " Numbered Tests " (or " General Observations ") which seem to deserve special notice as aids in differentiating between neighboring chemical species in any particular section of the tables are made more conspicuous by citation in pointed parentheses, ⟨ — ⟩.

LIST OF NUMBERED TESTS IN VOLUME IV

Color in the Higher Orders **4**.1
Specific Gravity in the Higher Orders **4**.2
Acidity, Acids, and " Neutralization Equivalent " **4**.3
Alkali, Reactions with, in Hot Solutions **4**.4
Silver Nitrate, Reactivity of Halogen Compounds Towards **4**.5
Halide Salts of Organic Bases **4**.6
Halogen-Substituted Hydrocarbons **4**.7
Alkali Fusion for Sulphur Compounds **4**.8
Carbon Disulphide, Decompositions by Sulphuric Acid Yielding **4**.9
Derivatives for Carboxylic and Sulphonic Acids (Chlorides, Amides, Methyl Esters, Metallic Salts) **4**.10
Acyl and Sulphonyl Halides (R.COX), ($R.SO_2X$) **4**.11
Amides of Sulphonic and Carboxylic Acids **4**.12
Mercaptans **4**.13
Esters of Isothiocyanic Acid (Mustard Oils) **4**.14
Ammonium Salts in the Higher Orders **4**.15
Gold, Platinum, Chlorine, and Molecular Weight Determination for Chloroaurates and Chloroplatinates of Organic Bases **4**.16
Mixed Melting-points **4**.17

4.1. Color.

For a description of the terminology of color used in this work and a color standard Cf. Chapter XIII, p. 230, Volume I.

The dyestuffs usually contain combinations of the elements which would call for their description among the compounds of the higher orders; but since the melting-points and boiling-points of most of them are not sharp, or have never been determined, and a different type of procedure than that adopted in Volume IV has in practice been found preferable for their examination, they have been treated as a separate class and described by themselves in Volume III. While a considerable body of colored compounds which are not dyestuffs remain for description in this volume, it has not been found necessary to divide the several orders into suborders according to the presence or absence of visible color, because in most of these orders the proportion of colored compounds other than yellow is very small.

4.2. Specific Gravity in the Higher Orders.

Specific gravity is used in Orders III and IV as a means for subdividing " Division B " (Liquids) into "Sections," by placing in Section 1 species whose specific gravity is higher than 1.15 in case of the chlorine compounds — or higher than 1.50 in case of the bromine compounds. The " Divisions " are thus subdivided into " Sections " of approximately equal size, and compounds in the same homologous series containing the same number of substituent halogen atoms are thus usually brought into proximity in the same section. Thus, the monochloralkanes, $C_nH_{2n+1}Cl$, fall into Section 2, having a density less than 1.15; while the dichloralkanes, $C_nH_{2n}Cl_2$, fall in Section 1. Similarly the monobromalkanes, $C_nH_{2n+1}Br$ — with the exception of methyl bromide — appear in Section 2, having a density less than 1.50; while the dibromalkanes $C_nH_{2n+1}Br_2$ having a gravity higher than 1.50 appear in Section 1. In general every increase in the number of substituent halogen atoms occasions an increase in density; and by inspection of the Tables it is thus often possible to draw useful deductions about the densities of compounds which have not been previously described.

Convenient methods for the determination of the specific gravity will be found in Chapter XIII, p. 227, of Volume I. The method using the 1 cc. pipette is very simple and rapid, and usually sufficiently accurate in view of the fact that only a small part of the density data for organic compounds are known to be reliable in the third decimal place.

4.3. Acidity, Acids, and "Neutralization Equivalent."

(a) Test the reaction towards litmus of a solution prepared by shaking a centigram of the substance with a cubic centimeter of distilled water or pure alcohol.

(b) If part (a) of this test shows acidity, attempt to determine a " Neutralization Equivalent " by titration with decinormal alkali and phenolphthalein, as described in T. 1.301 (Vol. I, p. 77).

The results in determining the " Neutralization Equivalent " in many of the Higher Orders, like III, IV, V, will sometimes be rendered valueless by the reactivity of halogen atoms towards alkali in the cold; but when a titration can be made rapidly, and it is found that no appreciable further addition of alkali is required to restore the pink "end-color" after the titrated mixture has been allowed to stand for five minutes, it may be assumed that the " Neutralization Equivalent " calculated will be an acceptable one, since the number of halogen compounds that are decomposed almost instantly by cold decinormal alkali is not large.

It will be recalled that the " Neutralization Equivalent " of an acid is obtained by dividing its molecular weight by its basicity, and that it is one of the most valuable and convenient numerical constants of all acids. Acids having halogen in an open chain in the β-position to carboxyl lose CO_2 and form alkali halide when solutions obtained by neutralizing the acid with alkali are warmed. Some acyl halides (R.COCl) react almost instantly with water to give corresponding organic acid and hydrochloric acid, while others are only very slowly affected. Most of them will give a strong acid reaction when shaken with warm water and tested with litmus. Halogen-substituted phenols usually react acid and sometimes titrate as monobasic acids.

4.4. Reactions of Nitrogen or Halogen Compounds with Hot Alkali Solution.

(**a**) *Preliminary Test for Ammonium or Substituted Ammonium Salts, and for the Reactivity of Halogen Atoms.* — Apply this test to every compound that contains either nitrogen or halogen!

Add three drops of the compound if a liquid, or 0.1 gram if a solid, to 5 cc. of an approximately normal solution of sodium hydroxide known to be free from chloride. If the compound is soluble in water, use an aqueous alkali solution; otherwise an alcoholic. Boil very gently in a test-tube for several minutes, and note whether the vapors have an ammoniacal, fishy, or basic odor, and whether they turn red litmus paper blue. Dilute with an equal volume of water and acidify with dilute nitric acid. If the solution is not clear, filter through a wet filter. Add a few drops of silver nitrate solution, which should be alcoholic in case the original solution was alcoholic and became turbid on dilution so as to require filtration.

If the compound contains nitrogen and the vapors while boiling with alkali have a basic odor and reaction, it may be an ammonium or substituted ammonium salt of an acid. In this case see T. **4**.15.

If the compound contains halogen and a precipitate of a silver halide is obtained with silver nitrate, the inference is that the halogen is " reactive " or loosely bound; or, if nitrogen is also present, that the halogen may be present as the anion of an organic salt. In the latter case the direct test with silver nitrate (T. **4**.5) will also give a precipitate. A precipitate with silver nitrate after boiling with alkali is to be generally expected from all compounds containing halogen in aliphatic combination, either in a simple open chain compound like ethyl bromide or acetyl bromide, or in an aliphatic side chain attached to an aromatic nucleus as in benzyl bromide. The reactivity of the halogen atom is usually greater for iodine than for bromine, and greater for bromine than for chlorine; but varies with its position and environment in the molecule.

A precipitate of silver halide is not to be expected from compounds in which the halogen is directly united to carbon in an aromatic nucleus unless the reactivity of the halogen has been increased by the proximity of special substituents like the nitro group. Hard and fast generalizations can not be made to cover all cases.

(**b**) *Use of Products from Treatments with Hot Alkali Solutions as Derivatives in Confirmatory Tests.* — The Analytical Tables contain numerous mentions of products formed by the treatment of particular compounds with alkali. Such statements are sometimes introduced merely to give an indication of the degree of stability of the substances, and it will generally be necessary to consult original authorities to ascertain whether the products can be isolated and purified with sufficient ease to make their use as derivatives in qualitative testing practicable. Besides the alkali-splittings by which esters yield acids and alcohols, and by which nitriles, amides, and anilides, yield ammonia, or amines, and acids; or in which saturated halogen substitution products of the hydrocarbons give less saturated compounds after loss of halogen acid, there are numberless other possibilities. The methods exemplified by " Procedure 2 " of Generic Test 5 on page 113 of Volume I for investigating the saponification products of esters of Order I, and for examining the saponification products from nitriles, amides, and anilides, in T. **2**.26 of Volume II, will, however, suggest how such problems may sometimes be practically attacked.

4.5. Silver Nitrate, Reactivity of Halogen Compounds Towards.

If the unknown compound is soluble in either water or alcohol, add a few drops of aqueous (or alcoholic) silver nitrate solution to about 5 cg. dissolved in 5 cc. of water (or alcohol) slightly acidified with dilute nitric acid. If a precipitate is obtained in the cold, or after warming, filter, and test the precipitate for silver halide by its behavior towards dilute nitric acid, and towards hot ammonia solution.

This test supplements T. **4**.4 (a), and should be applied to every halogen compound. If the silver halide precipitate forms quickly the halogen present must be very loosely held, and in case the compound is known to contain nitrogen as well as halogen the possibility that it is the halide salt of a nitrogen base must always be considered (Cf. T. **4**.6)!

4.6. Halide Salts of Organic Bases.

The presence of such salts will usually be suggested when examining compounds that contain both halogen and nitrogen by the immediate appearance of precipitates in the cold with silver nitrate in T. **4**.5, and the appearance of a precipitate or the development of a basic odor in T. **4**.4-a with alkali. Hydrochlorides of the nitrogenous bases that have been described in this work are sometimes entered in the Analytical Tables when the bases are important and the salts have known melting-points; but the corresponding hydrobromides and hydroiodides are less frequently tabulated. Halide salts of organic bases are neutral in reaction towards litmus when the bases are strong, and are then usually soluble in water without hydrolysis. The halogen acid salts of weak bases dissolve in water with pronounced acid reaction, and may be almost completely hydrolized by the water.

Salts of an organic base will usually be identified either by isolating the nitrogenous base after liberation by an excess of caustic alkali, or occasionally by conversion into the chloroplatinate, chloroaurate, or picrate. (Cf. Orders **4**.161, **4**.169, T. **2**.13, **2**.14 & **2**.23.)

4.7. Halogen Substituted Hydrocarbons.

Species of this group belonging to Orders III, IV, and V, are colorless when pure with the exception of a few very highly substituted iodine derivatives like tetraiodomethane, and iodoform. Many of the iodine compounds tend to darken on keeping in consequence of slight decomposition. These compounds are without exception insoluble in cold water. Those which contain halogen attached to a tertiary carbon atom, especially if the halogen is iodine, are often rather rapidly decomposed by hot water with the formation of a tertiary alcohol. The alkyl halides of lowest molecular weight have their halogen most loosely held. Iodine is more easily replaced in reactions than bromine, and bromine more easily than chlorine. Substances suspected of being halogenated hydrocarbons should always be tested in hot alcohol solution with sodium hydroxide and with silver nitrate by T. **4**.4 and T. **4**.5, methods which are intended to show whether halogen is firmly bound, as when attached to carbon in an aromatic nucleus, or more loosely held as when attached to carbon in an aliphatic molecule or to carbon in a side chain of an aromatic compound like benzyl chloride. The odors of such compounds when they are volatile and have halogen in a side chain are usually very irritating, while with halogen substituting in a purely aliphatic hydrocarbon or on the carbon of an aromatic nucleus, the odors are mild, sweetish-ethereal, or aromatic. The specific gravity of liquid halogen substituted hydrocarbons usually throws light on the degree of halogenation, and should always be determined (Cf. T. 4.2).

In confirmatory testing characteristic derivatives may often be obtained: by withdrawing hydrogen and halogen together from adjoining carbon atoms by treatment with hot alkali solutions; or by withdrawing halogen atoms in pairs by treatment in concentrated solutions in aqueous alcohol with bright granulated zinc and sulphuric acid; or, in the case of alkyl halogenides, by preparing characteristic esters by heating the compound alone, or in solution, with the dry silver salt of a suitable aromatic acid. Comprehensive detailed procedures for the preparation of such derivatives are difficult to formulate; but in individual cases suitable methods may often be devised with little difficulty after reference to the literature.

(a) (*Preparation of Dinitrobenzoate Esters from Alkyl Iodides.*) — The following procedure* may often be used with advantage in identifying alkyl iodides in which the iodine is attached to a carbon atom that is not directly linked with more than two other carbon atoms.

Dissolve 1.06 grams (1 mol.) of finely powdered 3,5- dinitrobenzoic acid in exactly 10 cc. of half-normal sodium hydroxide solution. Mix with a solution of 0.395 grams of silver nitrate in 5 cc. of water. Filter off the precipitated silver dinitrobenzoate by suction on a small filter, rinsing with 10 cc. of cold water. Place the salt, dried at a low temperature and powdered, together with a solution of about 0.17 cc. of the liquid iodide in 2 cc. of 95 per cent ethyl alcohol, in a dry 6-inch test-tube provided with a tight cork stopper bearing an 80 cm. stick of glass tubing 1 cm. in diameter to serve as reflux condenser. Support the test-tube vertically by a clamp so that the lower end containing the mixture shall be surrounded by oil maintained at a temperature of 100° C. in a 75 cc. beaker. Reflux for 25 minutes. Transfer the reaction mixture to a small semi-spherical glass capsule and remove the alcohol by evaporation on the water-bath. Extract the cold residue two or three times with 5 cc. portions of ether. Filter the solution. Evaporate the ether. Recrystallize the residue several times from the smallest possible quantities of boiling dilute alcohol until the melting-point of the product becomes constant. Three crystallizations will usually be necessary, and a 75 per cent alcohol usually gives satisfactory results with the esters formed from liquid iodides.

The dinitrobenzoates obtained by this method and described in the text all crystallize very easily from their cooling saturated solutions in long, fine, nearly colorless needles, and their melting-points are well scattered. Iodides of tertiary alkyl radicals lose hydriodic acid and give free dinitrobenzoic acid only. Some free acid may also be formed from secondary or primary iodides; but this is removed by the recrystallizations, or, if it be desired, by washing the crude ester with a weak sodium carbonate solution.

4.8. Alkali Fusion for Sulphur Compounds.

Mix thoroughly 0.1 gram of the substance and 1.0 gram of pure powdered sodium hydroxide moistened with two or three drops of water. Place in a nickel crucible of 20 cc. capacity. Support the crucible on a triangle made from iron wire set into notches filed in the upper edge of a slightly larger sheet iron crucible used as an air-bath so that the bottom and sides of the crucibles are parallel and about one quarter of an inch apart. Heat with a three-inch Bunsen flame until the mixture just melts, and then continue the fusion with occasional stirring for five minutes. Remove the crucible and cool. Add 3 cc. of cold water, and dissolve the mass by heating with a small flame. Pour the hot solution into a five-inch test tube. Cool. Add 4 cc. of 50 per cent sulphuric acid, drop by drop, keeping well cooled by shaking in water running from a tap.

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* Mr. M. J. Kavasji, to whom the author's thanks are due for the study of this useful procedure, reports that it gives satisfactory results with methyl, ethyl, propyl, isopropyl, butyl, isobutyl, sec.-butyl, and cetyl iodides, and also, very readily with benzyl chloride. It fails with the alkyl chlorides which have been tried, and usually gives rather unsatisfactory yields when applied to the alkyl bromides.

(**a**) Note whether there is any odor of sulphur dioxide or hydrogen sulphide. Spread a cap of filter paper tightly over the mouth of the tube. Place a drop of lead acetate solution on the cap and allow to stand one minute. The appearance of a dark spot on the paper indicates hydrogen sulphide derived from alkali sulphide formed in the fusion. If no hydrogen sulphide is detected remove the cap and test for sulphur dioxide as directed under (**b**).

(**b**) Make the test for sulphur dioxide by bringing a drop of the test reagent, held in a small loop made at the end of a thin glass rod, to within a quarter of an inch of the surface of the liquid in the test-tube and exposing it to the air within for five minutes. (The test reagent is prepared from 10 cc. of tenth normal hydrochloric acid, 3 cc. of normal barium chloride, and 1 cc. of tenth normal potassium permanganate solutions. The rod should be held in position by being thrust through a perforated cork stopper, and must not be allowed to touch the walls of the test tube. The solution must *not* be heated. Otherwise the color may be discharged in absence of sulphur dioxide.)

If the color of the permanganate is discharged and a distinct turbidity appears in the drop within five minutes, sulphur dioxide is present. If the color persists and there is no turbidity after ten minutes, the test is negative.

The compounds which are known to yield sulphur dioxide by this procedure are the sulphonic acids, with their salts; the sulphonyl halides; the sulphonamides; the sulphinic acids and their salts; the sulphones; the sulphoxides; phenyl and diphenyl sulphates. Sulphates of the metals and amines and the alkyl sulphates do *not* give sulphur dioxide.

The test for sulphur dioxide is so delicate that it enables the detection of one milligram in 10 cc. of solution with an exposure of three minutes. It is inapplicable in presence of hydrogen sulphide because this gas produces the same effect on the reagent as sulphur dioxide. The formation of hydrogen sulphide has been observed only as the result of fusions of compounds containing sulphur with a valence of two — never with simple sulphonated compounds.

Consideration of the general equation, $R.SO_3Na + NaOH = ROH + Na_2SO_3$, which represents the fundamental reaction between sulphonated compounds and alkali in fusions, at once suggests the isolation of the organic hydroxyl derivative formed as the most satisfactory means for completing the identification of sulphonic acids. But unfortunately this method in practise is seriously limited by the chance of destruction or removal by the alkali of substituent groups within the radical R when the latter is not a simple combination of carbon and hydrogen.

The generalizations and procedures given above are based on a series of experiments made by Mr. J. V. Meigs, to whose kindness the author is also indebted for a very careful study of the test as a whole. Good tests for sulphur dioxide were obtained: from the sodium salts of benzenesulphonic, benzenedisulphonic, 2-naphthol-6-sulphonic, 2-naphthol-6, 8-disulphonic, sulphanilic, sulphindigotic, alizarinesulphonic, anthraquinonesulphonic, and nitrobenzene-m-sulphonic acids; from 1-naphthol-4, 8-disulphonic, 2-naphthol-3, 6-disulphonic, 2-naphthol-3, 7-disulphonic, 2-naphthylamine-6-sulphonic, 2-naphthylamine-6, 8-disulphonic, 2-naphthylamine-3, 6-disulphonic, and 1-naphthylamine-4-sulphonic, and p-sulphaminobenzoic acids; from benzenesulphinic acid, benzenesulphonamide, diphenylsulphone, sulphonal, saccharine, and potassium phenyl sulphate. Good tests for hydrogen sulphide were obtained in this test from: thiobenzamide, thiosemicarbazide, phenylthiourea, allylthiourea, benzyl disulphide, potassium thiocyanate, guanidine thiocyanate.

4.9. Splittings by Sulphuric Acid Yielding Carbon Disulphide.* (Including remarks on reactions of Carbon Disulphide, Dithiocarbamates, Thiuram Disulphides, Xanthates, Thioureas, and Mustard oils.)

(*a*) In a round-bottomed flask of 125 cc. capacity place 2 grams of the unknown compound and 40 cc. of 6-Normal sulphuric acid. Connect the flask with the inclined condenser with bent inner tube delivering into a 6-inch U-tube surrounded by cold water as shown in Fig. *a* of T. **2**.26 on p. 38, Vol. II. Boil the acid briskly for *five minutes* with cold water circulating through the condenser jacket. Stop the flow of water and continue boiling until an increase of about 4 cc. in the volume of the liquid at the bend of the U is caused by the entrance of distillate. Any carbon disulphide in the distillate will be visible as a heavy, highly refractive globule under the water. Separate it from the water by aid of a thin stemmed pipette after having poured into a narrow test-tube and allowed to settle.

(*b*) Shake a good sized drop of the heavy product with a mixture of 5 cc. alcohol and 2 cc. of 6-Normal sodium hydroxide. Slightly acidify with acetic acid. Cool. Add a drop of 5 per cent copper sulphate solution. If the volatile product from the hydrolysis was carbon disulphide, a heavy dark brown precipitate of cupric xanthate, quickly changing to bright yellow (cuprous xanthate) appears.

The remaining portion of the separated disulphide will often be sufficient to enable a determination of boiling-point (after drying with a granule of calcium chloride) by the method of Siwoloboff (Vol. I, p. 222.) and other tests. (See No. **7**. 1365.)

(*c*) Transfer the acid mixture remaining in the distilling flask at the close of the distillation in paragraph (*a*) to a round bottomed flask of 250 cc. capacity. Add gradually, with good cooling, a quantity of sodium hydroxide solution equivalent to 50 cc. of 6-Normal NaOH. Drop in an ebullator tube. Connect the flask with the inclined condenser and U-tube, the latter being recharged with just enough water to seal the bend. Immerse the U-tube in a beaker of cold water. See that the condenser jacket is filled, but do not circulate water through it rapidly. Boil rather briskly for an hour or more to drive readily volatile amines over into the water. Then proceed for the identification of ammonia and amines as directed under (*a*) and (*b*) on p. 39 of Vol. II in T. **2**.26-D.

(*d*) The procedure of paragraph (*a*) has been applied to several types and species containing the (.S.C:S) group. The rather important salts of the dithiocarbamic acids with substituted ammonium bases, like $Et_2N.CS.SNH_2Et_2$, (which are formed by the direct union of carbon disulphide with an amine), and the xanthates, like EtO.CS.SNa, (which are formed by addition of alkali metal alcoholates to carbon disulphide), contain the (CS_2) group and are split almost quantitatively to give carbon disulphide. This splitting may be represented: in the case of the dithiocarbamates by the equation, $R_2N.CS.SNH_2R_2 + H_2SO_4 = CS_2 + (R_2NH)_2.H_2SO_4$; and in that of the xanthates by, $RO.CS.SNa + H_2SO_4 = ROH + CS_2 + HNaSO_4$.

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* The procedures and conclusions recorded under T. **4**.9 are based on experiments recently made in the laboratory of the author by Mr. William S. Johnson. The procedures described were applied to the following list of substances: methylammonium methyldithiocarbamate, ammonium phenyldithiocarbamate, piperidonium piperidyldithiocarbamate, dimethylammonium dimethyldithiocarbamate, diethylammonium diethyldithiocarbamate, and ammonium ethylphenyldithiocarbamate, methyl diethyldithiocarbamate (a dithiourethane); potassium xanthate; thiuramdisulphide, tetramethyldithiuram disulphide, tetraethyldithiuram disulphide, dipiperidyldithiuram disulphide, diethyldiphenyldithiuram disulphide, and dimethylthiuramdisulphides; thiourea, thiocarbanilid, phenylthiourea, triethylthiourea; and phenyl, ethyl, and allyl mustard oils.

The thiuram disulphides, although containing the (.S.C:S) group, do *not* yield a distillate after the brief treatment of paragraph (*a*) in which carbon disulphide can be detected.

Compounds containing the (S:C:) group, however, like thioureas ($NH_2.CS.NH_2$) and isothiocyanates RNCS give no carbon disulphide, but may yield sulphur or hydrogen sulphide. All these compounds contain bivalent S, and when not too volatile, may be expected to give Na_2S on fusion with alkali in T. **4**.8.

(*e*) *Thiuram Disulphides* ($R_2N.CS.S_2.CS.NR_2$) *from the Dithiocarbamates* ($R_2N.CS.SNH_2R_2$). — Dithiocarbamates with the formula shown usually react in cold concentrated alcoholic solution with iodine to give precipitate of thiuram disulphides according to the equation $2R_2N.CS.SNH_2R_2 + I_2$ (dialkylammonium dialkyldithiocarbamate) $= R_2N.CS.S_2.CS.NR_2 + 2R_2NH.HI$ (tetraalkylthiuramdisulphide), the thiouram disulphides, unlike the corresponding dithiocarbamates, being almost insoluble in cold alcohol. Since other compounds containing the (.CS.S.) grouping are likely to show similar behavior with iodine the following test is to be regarded rather as a means for securing derivatives of known melting-points for dithiocarbamates than as a quasi-generic test.

To obtain such thiuram disulphides, prepare a cold nearly saturated alcoholic solution of the dithiocarbamate. Drop into it a strong alcoholic solution of iodine until a distinct yellow color that is permanent appears. The precipitated thiuram disulphide will usually be sufficiently pure for a melting-point after washing with alcohol and drying.

4.10 Derivatives for Carboxylic and Sulphonic Acids. (Chlorides, Amides, Methyl Esters, Metallic Salts.)

Among the most useful derivatives in the identification of the carboxylic and sulphonic acids are their acid chlorides, amides, methyl esters, and metallic salts. In selecting such derivatives for confirmatory tests it should always be considered whether the structure of the acid is such that the desired derivative can probably be produced by the use of the reagents and conditions chosen without disturbing secondary reactions. (See T. **4**.11 and T. **4**.12 for further observations on acid chlorides and amides.)

(**a**) *Acid Chlorides.* — Mix thoroughly by grinding about half a gram of the well-dried acid, or one of its metallic salts, and about one and one half times the chemically equivalent quantity of phosphorous pentachloride. Warm for some time at or below the temperature of boiling water, if this temperature is sufficient to cause reaction, until the reaction is completed. Wash the residue with small quantities of ice-cold water to destroy the excess of reagent and remove the by-products of the reaction, if it is sufficiently stable to permit such treatment. If the product is a solid, recrystallize from warm saturated solution in petroleum ether, chloroform, benzene, or anhydrous ether, and determine the melting-point after reserving the greater part for conversion to the corresponding amide or methyl ester.

$$R.COOH + PCl_5 = R.COCl + POCl_3 + HCl$$
$$R.SO_2OH + PCl_5 = R.SO_2Cl + POCl_3 + HCl$$

(**b**) *Acid Amides.* — To prepare the acid amide, boil the acid chloride obtained in paragraph (**a**) for a few minutes with twenty parts of concentrated aqueous ammonia. Evaporate to dryness on a water bath in a small glass capsule, and recrystallize the residue from boiling water or dilute alcohol, until it assumes a constant melting-point. The evaporation of the ammonia is necessary only when the amide — as sometimes happens — is much more soluble in ammonia than in water so that it does not separate from the ammoniacal solution on cooling. The amides usually crystallize very easily, and in the case of the amides of the sulphonic acids their melting-points are much more uniformly recorded than those of the free acids.

$$R.COCl + NH_3 = R.CONH_2 + HCl$$
$$R.SO_2Cl + NH_3 = R.SO_2NH_2 + HCl$$

(**c**) *Methyl Esters* of aromatic acids may frequently be prepared from the acid chlorides obtained as above described from carboxylic acids by substitution of methyl alcohol for aqueous ammonia in the procedure of the last paragraph. (Cf. terephthalic acid T. **1**.318, Vol. I, p. 85.) Or, if there is reason to fear irregular decomposition from the use of phosphorous pentachloride because of peculiarities in the structure of the compound, they may often be conveniently secured by dissolving the acid in about twenty parts of pure methyl alcohol which has been partly saturated by dry hydrochloric acid gas in the cold, allowing to stand for twenty-four hours, precipitating the ester with cold water, and recrystallizing it from methyl alcohol or other suitable solvent. The methyl esters of aromatic acids are often crystalline solids when the corresponding ethyl and higher alkyl esters are liquids.

(**d**) *Metallic Sulphonates.* — Metallic sulphonates as a rule crystallize well, and the determination of the percentage of metal contained in their alkali or alkali earth salts has always been a favorite method in characterizing sulphonic acids. The crystals, it should be noted, often contain water of crystallization, the number of molecules of which may vary when the conditions for the crystallization are slightly changed. Analyses are therefore best made with specimens that have been thoroughly dehydrated by drying to a constant weight at a sufficiently high temperature. The determination of sodium, potassium, or barium in such salts is conveniently made by weighing out a gram in a crucible, moistening with concentrated nitric and sulphuric acid, fuming off the excess of acid, and igniting moderately until the residue is white and the weight constant. The percentage of alkali metal or barium in the salt may then be calculated from the weight of the alkali or barium sulphate obtained.

4.11. Acyl and Sulphonyl Halides (R.COX and R.SO$_2$X).

These compounds, which may be prepared as described in T. 4.10-a by the action of phosphorous halides on well-dried carboxylic or sulphonic acids or their

metallic salts, have unusual importance as derivatives in confirmatory tests. Largely on this account the *solid* species have been very completely listed in the Analytical Tables. The liquid sulphonyl chlorides cannot be distilled under atmospheric pressure without decomposition and are consequently seldom tabulated. Such compounds may, however, often be identified by conversion into the corresponding acid amides, which have higher melting-points and are easily prepared by the method of T. **4**.10-(b).

Since the acid chlorides react more or less readily with water or alcohol, the attempt should never be made to crystallize them from aqueous or alcoholic solvents; but petroleum ether, ligroin, benzene, chloroform, or anhydrous ether may generally be successfully used as solvents.

Sulphonyl chlorides that have been prepared from aromatic sulphonic acids that contain the nitro group or the amino group are very liable to have these radicals replaced by chlorine and to yield chlorine substituted sulphonyl chlorides if the temperature of the reaction is high and an excess of phosphorous chloride is used. Hydroxyl groups outside the SO_3H radical will also be replaced by chlorine, and even the SO_3H group itself may sometimes be so replaced. Naphthalene-2, 6-disulphonic acid, for example, with three molecules of phosphorous pentachloride at 165° gives 2, 6-dichlornaphthalene. One must, therefore, guard against the conclusion that derivatives obtained from sulphonic acids that are free from chlorine by treatment with phosphorous pentachloride *necessarily* contain all their chlorine in SO_2Cl groups!

(*a*). — Acid chlorides may be expected to give an acid reaction if boiled with water in T. **4**.3-(a); but few if any can be successfully titrated for " neutralization equivalent " in T. **4**.3-(b). The complete hydrolysis of the chlorides of aromatic sulphonic acids to halogen acid and free sulphonic acids is generally a slow operation even with hot water, sometimes requiring several hours boiling with reflux; but their saponification by alkali by T. **4**.4-(b) should always be possible; and the presence of their reactive halogen may be shown by T. **4**.5 with silver nitrate.

(*b*). — The sulphonyl halides should generally yield sodium sulphite and sodium halide in alkali-fusion (T. **4**.8).

(*c*). — In identifications the attempt should always be made to convert a sulphonyl chloride compound into the corresponding sulphonamide by the method of procedure of T. **4**.10-(b). The alternative procedure of warming a mixture of the chloride with powdered ammonium carbonate instead of aqueous ammonia is sometimes adopted, and may have advantages in certain cases.

4.12. Amides of Sulphonic (and Carboxylic) Acids.

Sulphonamides have been described for most of the sulphonic acids that give the corresponding sulphonyl chlorides when treated with phosphorous pentachloride (Cf. T. **4**.10-a), and are usually most convenient derivatives for such acids in confirmatory tests. Their use as derivatives in the characterization of amines has been mentioned in T. **2**.9 in Volume II. They are usually easily crystallized either from hot water, dilute alcohol, or alcohol. Those of the formula $RNHSO_2R'$ usually form sodium salts, and are accordingly soluble in aqueous alkali, while those with the formula $R_2N.SO_2R'$ are neutral and insoluble in alkali. All of them may be expected to give sulphur dioxide and ammonia or some amine on fusion with alkali (T. **4**.8); and, like the amides of the carboxylic acids (Cf. T. **2**.26), to

give the corresponding acid on saponification with hot alkali or acid (Cf. T. 4.4-b) provided the radicals R and R′ are sufficiently stable to alkali.

$$RNH.SO_2R' + 2NaOH = RNH_2 + Na_2SO_3 + R'OH$$
$$RNH.SO_2R' + NaOH = RNH_2R' + SO_3Na$$
$$RNH.COR' + NaOH = RNH_2 + R'CO_2Na$$

4.13. Mercaptans (R.SH)

The alkyl sulphydrates and thiophenols of low and medium molecular weight are all characterized by strong unpleasant garlic-like odors which are often very penetrating and persistent. They are nearly insoluble in water, but like the phenols are soluble in alkali solution by virtue of their weak acidic nature, and are precipitated from such solutions on acidification, or expelled from them, by simply boiling when the mercaptan is readily volatile. The mercury and lead mercaptides are often easily prepared by the direct action of mercaptans on mercuric oxide, or by precipitation from aqueous or alcoholic solutions of mercuric cyanide or lead acetate. The mercuric mercaptides often crystallize well from alcohol and have good melting-points. The lead mercaptides usually have a yellow color. The three simple color reactions described below are often of value as preliminary tests for compounds containing the sulphydryl groups.

(a) *Claesson's Ferric Chloride Test.* — Dissolve a small quantity of the substance in water or alcohol to which a little ammonia has been added. Add a few drops of very dilute ferric chloride solution. The alkyl and aryl sulphydrates cause the appearance of a deep blood-red or red-brown coloration. (Alkali and alkali-earth sulphydrates give green colorations.)

Claesson (Ber. **14,** 411) obtained a dark red in this test with methyl, ethyl, amyl and phenyl mercaptans, with toluylene disulphydrate, thioacetic acid, sodium thiosulphate, and the thiocyanates. Thioglycollic and thiolactic acids gave a dark red-violet color.

(b) *Denigès' Isatine Test.* — Add a few drops of a very dilute solution of the substance in alcohol to several cubic centimeters of a one per cent solution of isatine in pure sulphuric acid.

Mercaptans occasion the appearance of a fine green coloration. (Neither alkyl sulphides, hydrogen sulphide, nor sulphur dioxide give such colorations; but the test is masked by presence of aldehydes or higher alcohols.)

Denigès' (Compt. Rend. **108,** 350) has applied this reaction to methyl, ethyl, propyl, butyl, isobutyl, and amyl mercaptans.

(c) *Denigès' Nitroprusside Test.* — Denigès recommends the following test as a substitute for (b) in case of interference by aldehydes or higher alcohols.

Add to a solution or suspension of the substance in water a few drops of sodium hydroxide solution. Shake. Dilute this solution and add sodium nitroprusside solution. In absence of alkaline sulphides the appearance of a red color indicates the presence of a mercaptan. In the presence of alkali sulphide or hydrogen sulphide the test is still applicable if a solution of PbO in sodium hydroxide is substituted for the caustic alkali, the black precipitate of PbS not masking the red color. (Neither alkyl sulphides nor sulphur dioxide give this reaction.)

4.14. Isothiocyanic Esters (" Mustard Oils ").

The alkyl and aryl " mustard oils," unless of very high molecular weight, are characterized by pronounced pungent, more or less mustard-like odors — in which respect they differ from their isomers, the normal thiocyanates, whose odors are mildly alleaceous. They are nearly insoluble in water, but soluble in alcohol. When shaken with an ammoniacal solution of silver nitrate they give a black precipitate of silver sulphide, quickly on warming, and often even in the cold! The most convenient derivatives for use in their specific characterization are the easily crystallizing corresponding thioureas and phenylthioureas for whose preparation directions are given below. In case such a derivative is not directly mentioned in the characterization of a particular mustard oil, it is nevertheless quite probable that it may be found described elsewhere in this volume by reference to the "Alphabetical Index," or through a knowledge of its melting-point.

(**a**) (*Conversion to the corresponding thiourea.*)

$$[RNCS + NH_3 = RNH.CS.NH_2]$$

Heat several drops of the isothiocyanate in a test tube with an equal number of cubic centimeters of concentrated ammonia (sp. gr. 0.90), shaking until the reaction is complete. A clear solution will usually be obtained within a few minutes. Evaporate to dryness in a small glass capsule on a steam-bath, and determine the melting-point of the substituted thiourea that will remain as a crystalline residue.

(**b**) (*Conversion to the corresponding monophenyl-thiourea.*)

$$[RNCS + C_6H_5NH_2 = RNH.CS.NHC_6H_5]$$

Heat a few drops of the isothiocyanate for several minutes at a temperature not much above 100° C. with slightly more than an equimolecular quantity of aniline. Wash out any excess of aniline with water acidified with dilute hydrochloric acid. Crystallize the washed residue from hot dilute alcohol and determine its melting-point.

Alkyl isothiocyanates and monophenyl-*alkyl*-thioureas may in general be transformed to *thiocarbanilide* (s-diphenylthiourea) by *boiling* for a few minutes with a *considerable excess* of aniline in the procedure of paragraph (**b**).

$$[RNCS + 2C_6H_5NH_2 = C_6H_5NH.CS.NHC_6H_5 + RNH_2]$$

The avoidance of a large excess of aniline and too high a temperature is therefore important in applying this procedure if the production of the more characteristic monophenyl derivatives is desired.

4.15. Ammonium Salts in the Higher Orders.

Ammonium (and substituted ammonium salts) of the acids of the "Higher Orders" are not often described among the tabulated species of this work. It is therefore always advisable to apply T. **2**.8 (for ammonium salts) early in the study of every unknown compound found to contain nitrogen, unless T. **2**.7 or T. **4**.4 (which will give indication of radicals yielding volatile or insoluble bases on treatment with caustic alkali) have already been applied to the substance with negative results.

When a compound has been proved to be an ammonium salt, the attempt should be made to complete its identification by isolating and then identifying its acid. In such attempts the frequent instability towards alkali of acids containing halogen or sulphur, and the possibility that drastic treatments may yield decomposition products of the acid instead of the acid itself, must always be kept in mind.

4.16. Gold, Platinum, Chlorine, and Molecular Weight Determination for Chloroaurates and Chloroplatinates of Organic Bases.

These determinations are often necessary in identifying the species of Orders CLXI and CLXIX in Chapters XIII and XIV. (For remarks on the preparation of chloroaurates and chloroplatinates as derivatives, see T. **2**.13 and T. **2**.14 in Vol. II.)

(**a**) *To determine Gold or Platinum in these compounds:* Ignite a suitably purified, dried, and carefully weighed sample of the substance in a small crucible. Ignite very cautiously at first, with the cover of the crucible in place, to prevent mechanical loss from too rapidly escaping vapors. Then ignite more strongly with free access of air until the weight is constant. The residue is the pure noble metal.

(**b**) *To determine Chlorine as well as Platinum* in the same sample and thus economize in the use of material, Wallach (Ber. **14,** 753) has recommended the following procedure: — "Pour upon the substance in a weighed platinum dish a solution prepared by dissolving 0.5 to 1.0 gram of metallic sodium in absolute alcohol. Evaporate the alcohol until a skin begins to form. Ignite the remaining alcohol. If the alcohol has not been given opportunity to absorb water it will burn away quietly without any spurting. When the combustion ceases heat *gently* for a short time with a small flame. After cooling, rinse the Pt, C, NaCl, and Na_2CO_3 residue onto a filter with water. Wash the residue with hot water. Dry the filter. Return to the platinum dish, and ignite until the weight is constant. The gain in weight is platinum. Acidify the filtrate from the platinum with nitric acid and determine the chlorine by precipitation as silver chloride."

According to Wallach (**b**) gives very accurate results for chlorine, which in this case is not determinable by the Carius method, but gives slightly less satisfactory results for platinum. If applied to the analysis of chloroaurates the use of a platinum dish is obviously to be avoided. If very accurate gold and platinum determinations are required they should be made by procedure (**a**) in a second portion of the specimen.

In preparing samples for analysis remember the tendency of many chloroplatinates and chloroaurates to crystallize with water and alcohol, which is not always easily removed in drying.

(**c**) *The calculation of the molecular weight of the base " corresponding " to any chloroplatinate or chloroaurate* may be easily made if the percentage of noble metal has been determined, and if it be assumed, as is usually but not always true, that chloroaurates may be expressed by the formula $Base.HAuCl_4$, and chloroplatinates by the formula, $Base.H_2PtCl_6$.

In the case of a chloroaurate, let a = weight of noble metal obtained on ignition; and let b = weight of the thoroughly dried chloroaurate in grams. Then, a:b::197.2 (atomic weight of gold):M (molecular weight of the chloroaurate). And M′ (molecular weight of "corresponding base," if monacidic) = M′-240.0 (molecular weight of $HAuCl_4$); or, $\frac{M'-240.0}{2}$, if the " corresponding base " is diacidic. While in the case of a chloroplatinate, a:b::195.2 (atomic weight of platinum): M′ (molecular weight of the chloroplatinate). And, M(molecular weight of the "corresponding base" if monacidic) = M′-410.0 (molecular weight of H_2PtCl_6); or, $\frac{M'-410.0}{2}$ (if the base is diacidic).

4.17. Mixed Melting-point Test.

It is desirable that this test should be made a part of the final confirmatory testing in the identification of every solid compound that melts sharply and has been found to be probably identical with some previously described species of which a specimen can be secured for the experiment.

Carefully determine the melting-points of a thoroughly purified specimen of the compound, (*a*), that is under investigation, and of a likewise thoroughly purified specimen of the species, (*b*), with which the " unknown " has been found to be probably identical; and, finally, a mixture, (*c*), of equal parts of (*a*) and (*b*). The determinations must be made in the same apparatus and with all experimental conditions identical.

If the melting-point of the mixture (*c*) differs from those of its components, the compounds (*a*) and (*b*) are not identical, and the supposed identification was false. It would however be a serious error to assume that the converse of this proposition, viz. that if the melting-points of the mixture (*c*) is identical with those of its components (*a*) and (*b*), these components are identical is also *necessarily* true.

An extensive recent literature indicates that there are very many cases in which the melting-point of a compound is not appreciably lowered by admixture with another species of the same melting-point, and that the melting-point may be wholly unaffected or even raised by such admixture.

CHAPTER III

ORDER III

COMPOUNDS CONTAINING CHLORINE AS "ADDITIONAL ELEMENT"

GENERAL OBSERVATIONS

(A) Color (T. 4.1). — The only species in Order III described as having pronounced color possess quinonic structure or are chlorinated substitution products of anthracene.

(B) Divisions and Sections. — *Division A* contains all species that are solid at room temperature. It is not sub-divided.

Division B contains all species liquid at room temperature, and is divided into two sections. The species of Section 1 have a specific gravity higher than 1.15; those of Section 2 have a specific gravity lower than 1.15 (Cf. T. 4.2). The density of the liquid species is here a very valuable characteristic, which should always be determined, because it is often enough to establish the degree of chlorination and is very likely to be on record, or at least can be approximately predicted after inspecting the tabulated descriptions of similar species that have been previously prepared.

(C) Odor. — Intensely irritating odor, accompanied by lachrymatory power, is a common property among the volatile compounds of this order having chlorine on the carbon of a carbonyl group or on the carbon atom adjacent to a keto carbonyl group, or on the carbon of a side chain in a benzene derivative. A sweetish chlorine-like odor characterizes many of the more volatile chlorination products of the open chain hydrocarbons. The camphorous odor also frequently occurs in species of this order. It will be found that many species described in the Tables without mention of odor are actually odorous.

(D) Acidity. — Many species react neutral towards litmus when in contact with water or alcohol (T. 4.3-a), but none are basic. Always attempt to determine a "neutralization equivalent" by T. 4.3-b, but bear in mind that only those acids whose halogen is entirely unaffected in the cold by dilute alkali will yield "equivalents" that correspond to the values calculated directly from their known molecular weights and basicities. The chlorinated phenols react acid to litmus, but are not sufficiently ionized to give acceptable neutralization equivalents in titrations with phenolphthalein as indicator when containing a single atom of halogen. 2,4,6- Trichlorphenol ($k_A \times 10^8 = 2.6$ at 2.5°), however, titrates normally with a good end reaction as a monobasic acid.

(E) Behavior Towards Hot Alkali Solution. — The behavior of halogenated compounds when treated with hot aqueous or alcoholic alkali should always be studied by the methods given in T. 4.4. Some compounds lose their halogen readily, while others remain entirely unaffected. The degree of reactivity shown by the halogen is often indicated parenthetically in the Tables, even in cases where the reaction yields products whose isolation would be difficult or unprofitable.

(F) **Reactivity of Combined Chlorine Towards Silver Solution.** — Test 4.5 is a valuable supplement to T. 4.4 and should always be applied to species of this order.

(G) **Halogen Content.** — A determination of the percentage of halogen by the method of Carius is to be recommended in most cases when other suggested tests fail to yield a conclusive identification.

(H) **Special Cases.**

Halogenated Hydrocarbons. — Cf. T. 4.7.

Acyl Halides. — Cf. T. 4.11.

Halogenated Esters. — Saponify by Procedure 2 of Generic Test V of Vol. I (p. 113), and isolate any characteristic and alkali-stable saponification products.

ANALYTICAL TABLES

OF

ORDER III

COMPOUNDS CONTAINING CHLORINE AS "ADDITIONAL ELEMENT."

DIVISION A, SOLID SPECIES

No.	Melting-point (C.°).	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	— 17°	**Lauryl Chloride, $C_{11}H_{23}$.COCl.** — ⟨T.**4**.11⟩ — B.p. 142.5° (15 mm.). — Ammon. gives amide: m.p. 110°; 102°; 98.9°. (Ber. **15,** 1729.)
55	— 1°	**Myristyl Chloride, $C_{13}H_{27}$.COCl.** — ⟨T.**4**.11⟩ — B.p. 168° (15 mm.). — Conc. ammon. gives amide: ndl. fr. alc., m.p. 102°.
60	**4–5**	**2,5-Dichlortoluene, $Cl_2.C_6H_3$.Me.** — ⟨G.O.-E.⟩ — B.p. 200° (770 mm.). — Sp. Gr. 1.253 (20°). — Solidified by freezing mixture.
65	**7**	**o-Chlorphenol.** — Cf. No. **3**.2772 — B.p. 175–6°.
70	**12**	**Palmityl Chloride, $C_{15}H_{31}$.COCl.** — ⟨T.**4**.11⟩ — B.p. 192.5° (15 mm.), sl.d. — Conc. ammon. gives amide: cryst. fr. alc.; m.p. 106–7°; 104–5°.
75	**14**	**Brassidyl Chloride, Me.$(CH_2)_7$.CH:CH.$(CH_2)_{11}$.COCl.** — ⟨T.**4**.11⟩ — Colorless cryst. — Conc. ammon. gives amide: cryst. fr. alc.; m.p. 90°; 94°.
80	**14**	**Diphenylchlormethane, Ph_2.CHCl.** — ⟨G.O.-E⟩ — Radiate cryst. mass. E. decd. by heat to HCl & tetraphenylethylene.
85	**16–16.5**	**d,l-β-Chlorbutyric Ac., Me.CHCl.$CH_2.CO_2H$.** — ⟨T.**4**.3⟩ — B.p. 116° (22 mm.) — Dil. KOH gives crotonic ac. (Vol. 1) quantitatively.
90	**16; 12**	**γ-Chlorbutyric Ac., $CH_2Cl.CH_2.CH_2.CO_2H$.** — ⟨T.**4**.3⟩ — Cryst. fr. eth. + pet-eth.; d.s. aq.: — (At 200° dec. to HCl & butyrolactone). — MeĀ: b.p. 175° — Chloride: b.p. 173–4°.
95	**16; 17**	**1,2,4-Trichlorbenzene, $C_6H_3Cl_3$.** — ⟨G.O.-E⟩ — B.p. 213° (th. i.) — Sp. gr. 1.4460; (liq. at 26°).
100	18	**δ-Chlorvalerianic Ac., $CH_2Cl.(CH_2)_3.CO_2H$.** — ⟨T.**4**.3⟩ — Cryst. fr. eth. + pet-eth. — (Heated v. rapidly over free flame gives some valerolactone in fraction boiling between 230° & 240°).
105	17.8	**2,2,2-Trichlorethanol, $Cl_3C.CH_2OH$.** — ⟨G.O.-E⟩ — B.p. 151°(737 mm.). — Sp. gr. 1.550 (23°). Odor pleasant, ethereal. — V. hygroscopic tbl. D.s. aq.; misc. alc., eth.; s. KOH (sp. gr. 1.25) w. violet color. — Red. warm Fehling's sol.!
	17–18	**m-Chlorbenzaldehyde.** — Cf. No. **4**.2980. — B.p. 213–14°.
110	20–1.5; 19	**$1^2,1^2$-Dichloracetophenone, Ph.CO.$CHCl_2$.** — ⟨T. **4**.4-a⟩ — B.p. 247–8° (sl.d.). Sp. gr. 1.340 (liq.). Solidif. w. dif. — (Boiled w. alc. KĀc loses all Cl.) — Oxidn. by $KMnO_4$ gives benzoic ac.
115	20	**4-Chloracetophenone, $Cl.C_6H_4.CO.CH_3$.** — ⟨G.O.-E⟩ — B.p. 232°. — Sp. gr. 1.188 (20 mm.) — I. aq.; misc. alc., eth. — Oxidn. by $KMnO_4$ gives p-chlorbenzoic ac.

No.	Melting-point (C.°).	"ADDITIONAL ELEMENT" — CHLORINE. — SOLIDS.
120	23	**Stearyl Chloride, $C_{17}H_{35}.COCl$.** — ⟨T. **4**.11⟩ — B.p. 215° (15 mm., sl.d.). — Treatment w. ammon. gives amide: i. aq.; s.h.alc.; m.p. 109°.
125	24	**2,5-Dichlorphenol, $Cl_2.C_6H_3.OH$.** — ⟨G.O.-D⟩ — Cryst. fr. alc. Vol. w. st.
130	25.5–26.5	**1,3-Dimethylbenzoyl-(4) Chloride, $Me_2.C_6H_3.COCl$.** — ⟨T. **4**.11⟩ — B.p. 234–6°. — Amide: m.p. 179–81°; alm. i. c. aq. — Corresp. acid: m.p. 126°.
135	26	**3,5-Dichlor-1-methylbenzene, $Cl_2.C_2H_3.Me$.** — ⟨G.O.-E⟩ — B.p. 195°; 201–202° (729 mm.). Cryst., sol. at room temp. — Oxidn. by dil. HNO_3 gives 3,5-dichlorbenzoic ac.
140	27–8	**2,4-Dichlorphenyl-Methyl-Ether, $Cl_2.C_6H_3.OMe$.** — ⟨G.O.-E⟩ — B.p. 232–3° (743.5 mm.) — Orthorhombic pr.
145	28.5	**m-Chlorphenol, $Cl.C_6H_4.OH$.** — ⟨G.O.-D⟩ — B.p. 214° (th i.) — Cryst.
150	28	**$1^2,1^21^2$,4-Tetrachloracetophenone, $Cl.C_6H_4.CO.Cl_3$.** — ⟨G.O.-E⟩ — B.p. 181° (45 mm.)
155	29–30	**Behenolyl Chloride, $Me.(CH_2)_7.C\colon(CH_2)_{11}.COCl$.** — ⟨T. **4**.11⟩ — Ndl. decg. on distn. — E. s. alc., eth., bz., chlf., lgr. — W. ammon. gives amide: greasy scales; m.p. 90°; e.s. alc., eth., chlf., bz., lgr.; v. d. s. pet-eth.
160	29	**p-Chlorbenzyl Chloride, 1^1,4-Dichlormethylbenzene, $Cl.C_6H_4.CH_2Cl$.** — ⟨G.O.-E⟩ — B.p. 213–14°. — Powerful lachrymatory! — E.s. h. alc.; v.s. eth., CS_2. — (1 Cl. atom easily replaced in double decomposition!) — Ⓓ Oxidn. gives p-chlorbenzoic ac. (A. **146**, 320; **147**, 352).
165	30	**1,1,1,2,2,3,3,-Heptachlorpropane, $CCl_3.CCl_2.CHCl_2$.** — ⟨G.O.-E⟩ — B.p. 247–8°. — Cryst. mass of camphor-like odor!
170	30	**$1^1,1^1,1^1$,2-Tetrachlortoluene, $Cl.C_6H_4.CCl_3$.** — ⟨G.O.-E⟩ — B.p. 260° — Sp. gr. 1.51 (liq.) — (W. aq. @ 150° gives o-chlorbenzoic ac.)
175	31	**α-Chlorisobutyric ac., $Me_2.CCl.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 115° (50 mm.) — E. s. aq. — (Alkali gives HCl, isobutyric ac., etc.). — (EtĀ: b.p. 149° c.)
180	32	**9,10-Dichloroctadecanoic(1), Ac.Me.$(CH_2)_7.(CHCl).(CH_2)_7.CO_2H$.** — ⟨T.**4**.3 in alc.⟩ — Lft. fr. alc. — E.s. usual org. solv. — (Fr. Cl & elaidic ac. in chlf.).
185	32	**Perchlor-1,4-butadiene, $CCl_2\colon CCl.CCl\colon CCl_2$.** — ⟨G.O.-E⟩ — B.p. 268–9°(sl.d.) — Cryst. fr. eth.
190	33	**Phenyl Dichloracetate, $Cl_2CH.CO_2Ph$.** — ⟨G.O.-E⟩ — Lft. E.s. alc., eth.
195	34	**Trichloromethyl Trichloracetate, $Cl_3C.CO_2.CCl_3$.** — ⟨G.O.-E⟩ — B.p. 191–2° — Sp. gr. = 1.6733 35°/4°. — S. without decn. in chlf., pet-eth., bz. — Decd. by aq. to phosgene (odor!), trichloracetic ac. & HCl! — Gives diphenylurea & aniline salts w. aniline.
200	34–5	**1,2(?)-Dichlornaphthalene, $C_{10}H_6Cl_2$.** — ⟨G.O.-E⟩ — B.p. 280–2°. — Tbl. fr. alc. — W. HNO_3 in tube gives 3,4-dichlorphthalic ac.
205	34.2	**$1^1,3^1$-Dichlorxylene, $(CH_2Cl)_2.C_6H_4$.** — ⟨G.O.-E⟩ — B.p. 250–5°. — Sp. gr. 1.302 @ 20°.
210	34	**o-Chlorbiphenyl, $Cl.C_6H_4.Ph$.** — ⟨G.O.-E⟩ — B.p. 267–8°. — Monoclin, double pyr. — V.s. lgr. — Deliq. in eth.
215	35–5.5; 16	**α-Chlorisovalerianic Ac., $Me_2CH.CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 210–2°. — I. aq.; s. alc., eth. — (Heated w. aq. @ 180° gives α-oxyisovalerianic ac.)
220	35–6	**Cinnamyl Chloride, $Ph.CH\colon CH.COCl$.** — ⟨T. **4**.11⟩ — B.p. 154° (25 mm.) — (Decd. by distn. at ord. pressure). — W. ammon, gives amide: leafy cryst; v.d.s. c. aq.; m.p. 141.5°. — Corresp. ac.: v.d.s.c. aq; m.p. 133°.
225	34–6	**1^2-α-Chlorcinnamic Ald., $C_6H_5.CH\colon CCl\colon CHO$.** — ⟨G.O.-E⟩ — Lust. cryst. fr. eth., lgr. — E.s. alc., eth.
230	34.5–5.5	**polymeric β-Chlorpropionic Ald., "Acrolein Hydrochloride", $(CH_2Cl.CH_2.CHO.)_x$** — ⟨G.O.-E⟩ — Depolymerized by distn. — I. aq., e.s. alc., eth. — (Does not reduce Fehling's sol.).
235	37	**p-Chlorphenol, $Cl.C_6H_4.OH$. — ⟨G.O.-D⟩ — B.p. 217°. — Sp. gr. 1.306 @ 20°** — Odor faint, unpleasant, v. persistent. — Alm.i. aq.; v.s. alc., eth. — KOH fusion gives resorcinol.

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
240	38; 38–41	**9 or 10-Chloroctadecanoic(1) Ac.,** $\mathbf{Me.(CH_2)_8.CHCl.(CH_2)_7.CO_2H}$. — ⟨T. 4.3 in alc.⟩ — Ndl. fr. h. alc. — Fusion gives meta-labile modification: m.p. 22° — (KOH gives oxystearic ac., m.p. 83–7°.)
245	39	**Perchlorbutine, Perchlormesol,** $\mathbf{C_4Cl_6}$. — B.p. 283–4° (sl.dec.) (733 mm.) — Thin pr. fr. alc. — (Fr. chlorination of oenanthol.)
250	39	**Perchlorpentine, "Perchlormekylene,"** $\mathbf{C_5Cl_8}$. — Odor, camphor-like. — Oblique pr. fr. alc. — Gives off Cl & begins to boil at 270°.
255	41; 37–8	**β-Chlorpropionic Ac.,** $\mathbf{CH_2Cl.CH_2.CO_2H}$. — ⟨T. 4.3⟩ — B.p. 203–5° (decg. in part to HCl & acrylic ac.) — Lft. of fatty lustre; v.s. aq., alc. — Salts v. unstable decg., even at room temp., splitting off metallic chloride. — Chloride (fr. PCl_3): b.p. 143–5°. — EtĀ : b.p. 162°.
260	41	**(m)-Isophthalyl Chloride,** $\mathbf{C_6H_4.(COCl)_2}$. — ⟨T. 4.11⟩ — B.p. 276° — Cryst. mass.
265	41	**(Solid)-Dichlormaleic Ac. Tetrachloride,** $\mathbf{C_4OCl_6}$. — ⟨G.O.-E⟩ — (Fr. succinic ac. & PCl_5) — B.p. 209°. — Odor, camphor-like. — Sbl. v. easily. E.s. alc., eth., bz. — (Stable to boiling aq.)
270	41	**Octochlorcyclopentene,** $\ulcorner\mathbf{CCl_2.CCl_2.CCl{:}CCl.CCl_2}\urcorner$. — B.p. 283° — Thick pr. fr. lgr. — E.s. alc.
275	41.5	**$1^1,3^1$-Dichlor-1,3,5-trimethylbenzene,** $\mathbf{(CH_2Cl)_2.C_6H_3.Me}$. — ⟨G.O.-E⟩ — B.p. 260–5°. — Cryst. — (Boiled w. aq. & PbN_2O_6 gives $Me.C_6H_3(CH_2OH)_2$).
280	41	**(v)-2,3,4-Trichlortoluene,** $\mathbf{Cl_3.C_6H_2.Me}$. — ⟨G.O.-E⟩ — B.p. 231–2° (716 mm.) Ndl. fr. MeOH.
285	42	**ν-Chlorbrassidic Ac.,** $\mathbf{Me(CH_2)_7.CCl{:}CH.(CH_2)_{11}.CO_2H}$. — ⟨T. 4.3 in alc.⟩ — Gran. cryst. mass. — Na in alc. sol. gives brassidic ac.
290	42	**2,5-Dichlorbenzal Chloride,** $\mathbf{Cl_2.C_6H_3.CHCl_2}$. — ⟨G.O.-E⟩ — Cubes fr. chlf. — E.s. org. solv. — Odor faint & not unpleasant.
291	42	**Diphenylchlorethylene,** $\mathbf{Ph_2C{:}CHCl}$. — B.p. 298°. — Ndl. fr. alc. — E.s. eth., chlf., CS_2. — Heated in tube w. CaO gives stilbene.
292	42–3	**Octochloracetylacetone,** $\mathbf{CCl_3.CO.CCl_2.CO.CCl_3}$. — ⟨G.O.-E⟩ — B.p. 165–8° (30–2 mm.) — Thick cryst. fr. lgr. — Decd. by h. aq. to trichloracetic ac. & pentachlormalonic ac.
295	42.5	**3,4,5-Trichlortoluene,** $\mathbf{Cl_3C_6H_2.Me}$. — ⟨G.O.-E⟩ — B.p. 245.5–47° — Oxidn. by dil. HNO_3 gives 3,4-dichlorbenzoic ac.
300	43	**2,4-Dichlorphenol,** $\mathbf{Cl_2.C_6H_3.OH}$. — ⟨G.O.-D⟩ — B.p. 209–10° — Odor unpleasant, persistent. — 6-sided ndl. fr. bz. — E.s. alc., eth. — 100 pt. aq. @ 20° dis. 0.46 pt. — Sol. in dil. alc. reacts acid, but is mostly pptd. in cold from salts by CO_2. — Pb(OH).Ā: white amorphous ppt., i. aq. — MeĀ: m.p. 27–8°.
305	43	**β-Naphthoyl Chloride,** $\mathbf{C_{10}H_6.COCl}$. — ⟨T. 4.11⟩ — B.p. 304–6° — Cryst. — Acid: m.p. 184° C. — Amide: tbl.; d.s. c. alc.; m.p. 192°.
310	43–4	**3,4-Dichlorbenzaldehyde,** $\mathbf{Cl_2C_6H_3.CHO}$. — B.p. 247–8° — Odor like bitter almonds!
315	44	**Phenyl Chloracetate,** $\mathbf{ClCH_2.CO_2Ph}$. — ⟨G.O.-E⟩ — B.p. 230–5°. — Ndl. e.s. alc., eth.
320	45	**s-Dichloracetone,** $\mathbf{CH_2Cl.CO.CH_2Cl}$. — ⟨G.O.-E⟩ — B.p. 172.5°c. — Odor highly irritating! E. volat. — Blisters the skin. — S. aq.; e.s. alc., eth. — E. attacked by NaOH or Na_2CO_3. — CrO_3 mixt. oxid. to chloracetic ac.
325	43–50	**Chloracetaldehyde Hydrate,** $\mathbf{2CH_2Cl.CHO + H_2O}$. — ⟨G.O.-E⟩ — B.p. 85.5°c. — Odor weak, fruity! Monoclin. tbl. fr. aq. — S. aq., alc., eth.
330	45.5	**o-Chlorbenzophenone,** $\mathbf{Cl.C_6H_4.CO.C_6H_5}$. — ⟨G.O.-E⟩ — B.p. 330°c. — I. aq.
335	45–46	**1,2,3,4-(v)-Tetrachlorbenzene,** $\mathbf{C_6H_2Cl_4}$. — ⟨G.O.-E⟩ — B.p. 254° (th.i). — Ndl. — D.s. alc.; v.s. eth., lgr., CS_2.
340	46	**Hexachlorhexadienone, Hexachlorphenol,** $\mathbf{Cl_6.C_6O}$. — *Yel. cryst.!* Gives off Cl when heated! — (Zn + HCl gives pentachlorphenol).

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
345	46	**Dichlor-m-cresol, $Cl_2,Me.C_6H_2.OH$.** — ⟨G.O.-D⟩ — Ndl. — Vol. w. st. — V.s. alc., eth., chlf., lgr.
350	46	**Chloracetic Anhyd., $(CH_2Cl.CO)_2O$.** — ⟨G.O.-E⟩ — B.p. 109–11° (10 mm.) — Pr. fr. bz. — E.s. c. eth., chlf.; less s. bz. — (K_2CO_3 gives polyglycolid).
360	46	**Chloralethylalcoholate, $CCl_3.CH(OH)(OEt)$.** — ⟨G.O.-E⟩ — B.p. 115° — Sp. gr. 1.143(40°). — E.s. aq.; but unlike chloral hydrate, wh. it resembles, (Cf. m.p. 57°) it *dis. slowly!* — Conc. H_2SO_4 dec. to chloral & alc. — Aq. sol. warmed w. NaOH sol. & I gives iodoform!
365	46	**Erucic Ac. Dichloride, $Me.(CH_2)_7.CHCl.CHCl.(CH_2)_{11}.CO_2H$.** — ⟨T. **4**.3 in alc⟩ — Lft. — I. dil. alc. — Boiled w. Na amalgam & alc. gives erucic ac. — (H. alc. KOH attacks.)
370	47	**Cerotyl Chloride, $C_{25}H_{51}.COCl$.** — ⟨T. **4**.11⟩ — Corresp. amide: cryst. gran.; m.p. 109°; i. c., e.s. h. alc. — Corresp. ac.: i. aq.; m.p. 78°.
	47.4	**Chloral Hydrate.** — Cf. m.p. 57°.
375	47.5	**p-Chlorbenzaldehyde, $C_6H_4Cl.CHO$.** — ⟨G.O.-E⟩ — B.p. 213–14° — Odor like benzaldehyde! — Plates — D.s. c. aq.; more s. h.; e.s. alc., eth. — $NaHSO_3$ comp: d.s. cryst.
380	48	**1,6-Dichlornaphthalene, $C_{10}H_6Cl_2$.** — ⟨G.O.-E⟩ — Ndl. — HNO_3 oxidn. gives mixt. of chlor- & nitro-phthalic ac.
385	48–50	**$\beta\gamma$-Dichlorbutyric Ac., $CH_2Cl.CHCl.CH_2.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 123° (8 mm.) (sl. d.) — E.s. eth., chlf.; mod.s. h. lgr. — (Heated w. aq. & K_2CO_3 gives some oxycrotonic ac. lactone.)
390	48–9; 33	**5-Chlorcresol-(2), $Cl,Me,C_6H_3.OH$.** — ⟨G.O.-D.⟩ — B.p. 220° — Ndl. fr. eth.
395	48–50	**Lignoceryl Chloride, $C_{23}H_{47}.COCl$.** — ⟨T. **4**.11⟩ — E.s. eth., lgr. — Corresp. ac.: i. aq.; m.p. 80.5°.
405	50	**α,β-Dichlorpropionic Ac., $CH_2Cl.CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 210°d. — (Alk. gives α-chloracrylic ac. easily).
410	50	**α,β,β-Trichlorisobutyric Ac., $CHCl_2.CClMe.CO_2H$.** — ⟨T. **4**.3⟩ — Pr. — Dec. on distn. — Aq. gives oil, s. in much aq. — Salts unstable — (Boiling alk. removes HCl).
415	50	**Carbamyl Chloride, $NH_2.CO.Cl$.** — B.p. 61–2° — Odor powerful! — Cryst. — Decd. vigorously by aq. to CO_2 & NH_4Cl! — W. alc. gives ethyl carbamate, No. **2**.1540.
420	50–51	**1,1,1-Trichlorpropanol-(2), $CCl_3.CH(OH).Me$.** — ⟨G.O.-E⟩ — B.p. 161.8° (773 mm.) — Odor camphorous! — Taste, burning. — Monoclin. — Cryst. — Sbl. at ord. temp.; d.s. aq.; e.s. org. solv.; s. conc. KOH, sol. soon decg. w. sepn. of oil. Alc. KOH gives acetaldehyde, formic ac. & lactic ac. — (The hypnotic, " Isopral " C,1903,II,899.)
425	50–51	**1,2,3,5(α)-Tetrachlorbenzene, $C_6H_2Cl_4$.** — ⟨G.O.-E⟩ — B.p. 246° - D.s. c. alc. — Gives nitro deriv. of m.p. 21–2°.
430	50.5	**3,3,4-Trichlorpentanol-(2), $Me.CHCl.CCl_2.CH(OH).Me$.** — ⟨G.O.-E⟩ — B.p. 108–9° (20 mm.) — Odor camphorous. — Ndl. fr. eth. — Vol. w. st.; d.s. aq.; e.s. alc., eth. — Fuming HNO_3 oxid. to trichlorbutyric ac.: m.p. 59.5°.
435	50	**Camphenylyl Chloride, $C_8H_{14}:CHCl$.** — ⟨G.O.-E⟩ — B.p. 73° (11 mm.) — Soft, v. volat. mass.
440	51.5–2	**α,β,β-Trichlorbutyric Ac., $Me.CCl_2.CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — Tbl. fr. lgr. — D.s. aq.; v.s. alc., eth., bz., chlf., CS_2. — (Alc. KOH gives dichlorcrotonic ac. mixt.)
445	51	**$1^2,1^2,4$-Trichloracetophenone, $Cl.C_6H_4.CO.CHCl_2$.** — ⟨G.O.-E⟩ — B.p. 178° (45 mm.). — Oxidn. gives p-chlorbenzoic ac., **3**.2110.
450	52–3	**6-Chlorcresol-(3), $Cl,Me.C_6H_3.OH$.** — ⟨G.O.-D⟩ — B.p. 236°. — Ndl. fr. pet-eth.
455	53.4	**2,3,5(?)-Trichlorphenol, $Cl_3.C_6H_5.OH$.** — ⟨G.O.-D⟩ — B.p. 252–3°. — Odor intensely phenolic! — Long silky ndl. fr. dil. alc.
460	53	**p-Dichlorbenzene, $C_6H_4Cl_2$.** — ⟨G.O.-E⟩ — B.p. 173.7° (th.i) — Sp. gr.

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
		1.2675 (55/55). — Misc. h. abs. alc.; e.s. eth., bz., CS_2. — Monoclin lft. fr. alc. — Sbl. at ord. temp.
465	53-4	**1,2,3-(ν)-Trichlorbenzene, $C_6H_3Cl_3$.** — ⟨G.O.-E⟩ — B.p. 218-9° — Cryst. fr. alc. in tbl. — R.d.s. alc.
470	53.6	**$1^1,1^1,1^1,2^1,2^1$-Pentachlor-o-xylene, $CHCl_2.C_6H_4.CCl_3$.** — ⟨G.O.-E⟩ — Cryst. — Boiled w. much aq. gives $CHO.C_6H_4.CO_2H$. — (Fr. o-xylene + PCl_5 @ 200°.)
475	54	**(Solid)-Chlorstilbene, PhCCl:CHPh.** — ⟨G.O.-E⟩ — B.p. 320-4°(sl.d.) — Tbl. — I. aq.; e.s. h. alc. — W. alc. KOH gives tolane.
480	55; 57; 52	**Trichloracetic Ac., $Cl_3C.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 195°; 196-7°. — Deliq. rhomb. — V.s. aq., alc., eth. — Boiling sol. in aq. (accelerated by alkali) gives chloroform! (No. **4**.2325)
485	50-5; 69	**Phenyldichloracetic Ac., $Ph,Cl_2.C.CO_2H$.** — ⟨T. **4**.3⟩ — Deliq. tbl. — V.s. aq., alc., eth.
490	55	**β-Chlortiglic Ac., $Me.CCl:CMe.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst. d.s. aq. (less s. than β-ac. of m.p. 73°).
492	55	**3,5-Dichlorcresol-(2), $Cl_2(HO).C_6H_2.Me$.** — Ndl. fr. h. aq. — D.s. h. aq.; e.s. alc., eth. — Evapn. of ammon. sol. leaves free dichlorcresol (unlike dichlor-p-cresol).
495	55	**$1^1,2^1$-Dichlorxylene, $C_6H_4(CH_2Cl)_2$.** — ⟨G.O.-E⟩ — B.p. 239-41° — Sp. gr. 1.393(0°). — Odor v. pungent! — V.s. alc., eth., chlf., lgr.
500	56	**β,β-Dichlorpropionic Ac., $CHCl_2.CH_2.CO_2H$.** — ⟨T. **4**.3⟩ — Pr. — E.s. aq., alc., eth., chlf., bz. — Alc. KOH gives β-chloracrylic ac. — Amide: ndl. fr. chlf.; m.p. 140°; e.s. aq.
505	55; 57	**5-Chlor-2-hydroxyacetophenone, $Cl,(HO).C_6H_3.CO.Me$.** — ⟨G.O.-D⟩ — Scales fr. dil. alc. — $FeCl_3$ colors cherry-red. — (Pat.)
510	56	**2-(β)-Chlornaphthalene, $C_{10}H_7Cl$.** — ⟨G.O.-E⟩ — B.p. 264-6°c. (751 mm.) — Sp. gr. 1.2656(16°).
515	57	**Chlorbenzoquinone, $C_6H_3ClO_2$.** — *Odor pungent, quinone-like! — Yel.-red rhomb. cryst.!* — Volat. at room temp. — E.S. aq., alc., chlf., eth.; s. in conc. H_2SO_4 on warming w. black-brown color.
520	57; 47.4	**Chloral Hydrate, $CCl_3.CH(OH)_2$.** — ⟨G.O.-E⟩ — B.p. 96-98°. — (*M.p. much influenced by rate of heating.* Cf. M&J 1-2, 870). Clear monoclin. tbl. — Odor charac., penetrating-aromat! — Taste, sl. bitter & caustic. — Volat. slowly in air. — Neut. to litmus — 1 gram s. in : 0.25 cc. aq.; 1.3 cc. alc.; 1.5 cc. eth.; 2 cc. chlf.; 45 pt. c. CS_2. — Shaken w. conc. H_2SO_4 gives liq. chloral. — Gives strong carbylamine odor when warmed w. NaOH sol. & aniline in T. **2**.12! — (In aq. sol. w. yel. ammon. sulphide suddenly gives yel. ppt. after few minutes. Am. **19**, 603).
525	57-8	**2,5-Dichlorbenzaldehyde, $Cl_2.C_6H_2.CHO$.** — ⟨G.O.-E⟩ — B.p. 231-3° — Ndl. — V.s. alc.
530	58-9	**1^2-Chloracetophenone, Phenacyl Chloride, $Ph.CO.CH_2Cl$.** — ⟨G.O.-E⟩ — B.p. 244-5°. — Tbl. f. dil. alc. — G-1.324 (15) — Vapors powerful lachrymatory! — I. aq.; v.s. alc., eth., etc. —
535	59	**2,4-Dichlor-1,3,5-trimethylbenzene, $Cl_2.C_6H.Me_3$.** — ⟨G.O.-E⟩ — B.p. 243-4°. — Vol. at room temp. E.s.c. alc.; v.s. eth., bz. — (Stable toward oxidg. agts.)
540	60	**α,α,β-Trichlorbutyric Ac., $Me.CHCl.CCl_2.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 236-8°. — Cryst. fr. hexane. — Deliq. to oil s. in 20-25 pt. aq. — Na salt boiled w. aq. dec. to CO_2 & dichlorpropene. — PCl_5 gives chloride: b.p. 162-6°; wh. w. aq.-NH_3 gives amide: scales fr. alc.; d.s. c. aq.; m.p. 96°.
545	60	**Melissyl Chloride, $C_{29}H_{59}.COCl$.** — ⟨T. **4**.11⟩ — Amide: (fr. ammon.) m.p. 116°.
550	60.5	**2,4,6-Trichlorphenyl Methyl Eth., Trichloranisole, $Cl_3.C_6H_2.OMe$.** — ⟨G.O.-E.⟩ — B.p. 240° (th.i.; 738 mm.) — Ndl. fr. alc.
555	61	**β-Chlorisocrotonic Ac. (of m.p. 61°) $Me.CCl:CH.CO_2H$.** — ⟨T. **4**.3⟩ — 194.8°c. (Heat does not isomerize). — 4-sided pr. w. oblique terminal planes fr. aq. — Sbl. easily. V. vol. w. st. — S. in 52.4 pt. aq. @ 19° —

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
		Heated w. conc. NaOH sol. (18.6 g. KOH in 100 cc.) gives acetone, HCl & CO_2 @ 115–6°. — KĀ + H_2O: cryst. s. in 12.4 pt. abs. alc. @ 20°.
567	58–60; 62–4	**6-Chlorthymol, $Cl.C_6H_2.Me(C_3H_7)(HO)$,(Me:C_3H_7:HO = 1:4:3).** — ⟨G.O.-D.⟩— Tbl. fr. lgr.
568	61	**Trichlorthymol, $Cl_3.C_6.Me(C_3H_7)(HO)$.** — ⟨G.O.-D.⟩ — Oblique-rhomb. cryst. fr. eth.-alc. — Dec. abt. 180°. — D.s. alc.
570	61.5–2	**2,2,3-Trichlorbutanol-(1), $Me.CHCl.CCl_2.CH_2.OH$.** — ⟨G.O.-E.⟩ — B.p. 199–200°. — D.s. h., alm. i. c. aq.; e.s. alc., eth. — Red. Fehling's sol. on boiling.
575	61.18; 62.5–3.5	**Chloracetic Ac., $Cl.CH_2.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 189°. — Sp. gr. 1.3978 (65/65) — Deliq. ndl. or rhomb. tbl. — When completely melted at 70°, re-melts after solidifg. at 56°, (52°). Other modifications, all changing to ordinary ("α") form on contact with cryst. of latter, have been described. The "β" modification melts at 56°; the "γ" at 50°. — Odor, sharp, sour! Blisters skin. — V.s. aq. w. marked temp. lowering. — Comp. decd. by protracted boiling w. aq. to HCl & glycol. — (RĀ: all liq.) — Chloracetamide: monoclin. pr.; s. in 10 pt. c. aq. (fr. 1 vol. EtĀ + 2 vol. conc. ammon., standing 24 hr.); m.p. 119.5°. — Acid chloride: (fr. PCl_3 @ 101°); b.p. 105–6°.
580	62	**1,7-Dichlornaphthalene, $C_{10}H_6Cl_2$.** — ⟨G.O.-E.⟩ — B.p. 286°. — Ndl. — V.s. alc.
585	63	**α,β-Dichlorbutyric Ac., "Crotonic Ac. Dichloride"., $Me.CHCl.CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 132–3°c. (27 mm.) — Pr. fr. eth. Deliq. W. much aq. gives emulsion, later separating in layers. V.s. alc., eth.; e.s. chlf., bz., CS_2; d.s. c. lgr. — (Chloride: b.p. 164°c. — MeĀ: b.p. 174–80°; sp. gr. = 1.2809 (0/4°).)
590	63.5–4 (763)	**Oxalyl Chloride, COCl.COCl.** — M.p. 12°. — Vapors very irritating to lungs! — Aq. or dil. NaOH decs. quantitat. to CO,CO_2 & HCl! — Gently warmed w. $AlCl_3$ (in CS_2) gives CO & phosgene (No. **3**.2300) quantitatively.
595	63	**β-Tolane Dichloride, PhCCl:ClCPh.** — B.p. 178° (18 mm.) — Long ndl. — 100 pt. abs. alc. @ 24.4° dis. 10.51 pt.
600	63; 63.4	**1,3,5-(s)-Trichlorbenzene, $C_6H_3Cl_3$.** — ⟨G.O.-E.⟩ — B.p. 208.5° (Th.i., 764 mm.). — Ndl.
605	64.5	**Myricyl Chloride, $C_{30}H_{61}Cl$.** — ⟨T. **4**.11⟩ — Amorph. flocks fr. lgr. — Corresp. ac.: i.aq.; m.p. 53.8°.
610	64	**2,5-Dichlor-2,5-dimethylhexane, $Me_2CCl.(CH_2)_2.CClMe_2$.** — ⟨G.O.-E.⟩ — Lft. s. alc., eth., chlf.
615	65	**α-Chloracrylic Ac., CH_2:CCl.CO_2H.** — ⟨T. **4**.3⟩ — Ndl. — Fuming HCl @ 100° gives α,β-dichlorpropionic ac., — AgĀ, cryst. ppt.
620	65	**2,6-Dichlorphenol, $Cl_2C_6H_3.OH$.** — ⟨G.O.-D.⟩ — B.p. 218–20°. — Fine ndl. — Misc. alc., eth.
625	65.5	**2,3,4,6-Tetrachlorphenol, $Cl_4.C_6H.OH$.** — ⟨G.O.-D.⟩ — Ndl. fr. lgr. — V.s. alc.
630	65	**Brassidic Acid Dichloride, $Me.(CH_2)_7.CHCl.CHCl.(CH_2)_{11}.CO_2H$.** — ⟨T. **4**.3⟩ — Lft. — I. dil. alc. — Redctn. w. Na amalgam & alc. gives brassidic ac. — (Alc. KOH @ 130° gives chlorerucic ac. only).
635	65	**o-Dichlorbibenzyl, $Cl.C_6H_4.CH_2.CH_2.C_6H_4Cl$.** — ⟨G.O.-E.⟩ — Lust. lft. fr. 90° alc. — E.s. org. solv.
640	66.2–66.5	**α-Chlorisocrotonic Ac., $CH_3.CH:CH.CO_2H$.** — ⟨T. **4**.3⟩ — Ndl. fr. aq. (Sep. on acidifn. of sol. of salts at first as oil.). — S. in 15.3 pt. aq. @ 19°. D.s. c. lgr.; e.s. h. — Heated 12 hr. in sealed tube @ 150–60° changes completely to α-chlorcrotonic ac., m.p. 99.2°. — KĀ: silky ndl. fr. alc., s. in 22 pt. 99.5% alc. @ 16.5° (Dif. fr. α-chlorcrotonic ac.).
645	66–67	**Arachidyl Chloride, $C_{19}H_{39}.COCl$.** — ⟨T. **4**.11⟩ — Scales fr. eth. — V. unstable. (Ber. **11**, 2031). — Ammon. gives amide: ndl. fr. alc.; i. eth., lgr.; m.p. 108° — Corresp. ac.: i. aq.; m.p. 77°.
650	66	**Trichlorstilbene, $C_6H_4Cl:CH.CCl.C_6H_4Cl$.** — ⟨G.O.-E.⟩ — Scales fr. eth.
655	67–8	**2,4,6-Trichlorphenol $Cl_3.C_6H_2.OH$.** — ⟨G.O.-D.⟩ — B.p. 243.5–4.5°. — Ndl.

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
		N. Eq. by T. **4**.3-b = 197. ($K_A \times 10^8 = 2.6$ @ 25°). — 1000 pt. aq. @ 25° dis. 0.858 pt.; or 2.43 pt. @ 96°; v.s. alc., eth. — W. $KClO_3$ & HCl gives chloranil (No. **3**.2190). — $Ba\bar{A}_2$. $4H_2O$: d.s. lft.
660	67–68	**1,4-Dichlornaphthalene, $C_{10}H_6Cl_2$.** — ⟨G.O.-E⟩ — B.p. 286–7° (740 mm.) Silky ndl. fr. alc. — Boiled w. HNO_3 (Sp. gr. 1.30) gives dichlorphthalic ac. (Ber **27**, 409).
665	68	**4,6-Dichlor-m-xylene, $Cl_2.C_6H_2.Me_2$.** — ⟨G.O.-E.⟩ — B.p. 222°. — Lft. — E.s. eth., chlf., bz.
670	69	**Perchlorether, $(C_2Cl_5)_2O$.** — ⟨G.O.-E.⟩ — Cryst. — Sp. gr. = 1.900 (14.5°). — Odor, pungent, camphorous! — Dec. on boiling to C_2Cl_6 & $CCl_3.CO.Cl$. — (Fr. action of dry Cl on eth.)
675	69; 66	**1,4,6-Trichlornaphthalene, $C_{10}H_5Cl_3$.** — ⟨G.O.-E.⟩ — Ndl. — D.s. h.alc.; e.s. bz. — (M.p. when refused, 56°, but higher after standing.)
680	70	**1-Chlornaphthol-(2), $Cl.C_{10}H_6.OH$.** — ⟨G.O.-D.⟩ — Ndl. fr. lgr. — E.s. alc., bz., chlf., h.lgr.
685	abt. 70	**o-Benzoylbenzoyl Chloride, $PhCO.C_6H_4.CO.Cl$.** — ⟨T. **4**.11⟩ — Pr. — (Corresp. ac.: m.p. 85–7°; 93–4°; cryst. fr. h.aq.)
690	70–71	**2,4-Dichlorbenzaldehyde, $Cl_2.C_6H_3.CHO$.** — Pr. — Odor like benzaldehyde! — Oxid. to 2,4-dichlorbenzoic ac. by $KMnO_4$.
695	70–1	**5-Chlor-1,2,4-trimethylbenzene, $Cl.C_6H_2Me_3$.** — ⟨G.O.-E.⟩ — B.p. 213–5° — Lft.
705	70.5; 66	**p-Chlorbenzyl Alc., $Cl.C_6H_4.CH_2OH$.** — ⟨G.O.-E.⟩ — Cryst. fr. aq. — V.d.s. h.aq.; e.s. alc., eth.
710	71	**2,5-Dichlor-p-xylene, $Cl_2.C_6H_2.Me_2$.** — ⟨G.O.-E.⟩ — B.p. 221° (th.i.) — Lft. d.s. c. alc.
715	72.5–73	**1,2,3,4-Tetrachlorbutane, $CH_2Cl.CHCl.CHCl.CH_2Cl$.** — ⟨G.O.-E.⟩ — B.p. 130–40° (50 mm.) — Long strong smelling pr.
720	73	**β-Chlortiglic Ac. (of m.p. 73°), $Me.CCl{:}CMe.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 209–10° — Cryst. — E. vol. w. st. — D.s. c. aq.; e.s. alc., eth. — (W. 57% KOH @ 140–60° gives methylethylketone. Dil. KOH sol. does *not* attack).
725	73	**4,5-Dichlor-1,2-dimethylbenzene** (solid modif.), **$Cl_2.C_6H_2.Me_2$.** — ⟨G.O.-E.⟩ — Ndl. fr. alc.
730	73–5	**α,α,γ-Trichlorbutyric Ac., $CH_2Cl.CH_2.CCl_2.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst. s. in 20 pt. aq. — (Alk. removes γ-Cl. v. easily).
735	74–5; 76; 73	**Trichloracrylic Ac., $CCl_2{:}CCl.CO_2H$.** — ⟨T. **4**.3⟩ — Pr. fr. CS_2. — E.s. alc., eth., chlf., h.aq. Aq. @ 20° dis. 6%. — Amide: m.p. 96–7°; d.s. c. aq.
740	75–6	**Chloralacetone, $CCl_3.CH(OH).CH_2.CO.Me$.** — ⟨G.O.-E.⟩ — Cryst. fr. lgr. — Sbl. E.s. alc., eth.; s. h.aq.
745	75.5	**p-Chlorbiphenyl, $Cl.C_6H_4.Ph$.** — ⟨G.O.-E.⟩ — B.p. 282°. — Oxidn. gives p-chlorbenzoic ac. (No. **3**.2110).
750	74; 78	**1,2,5-Trichlornaphthalene, $C_{10}H_5.Cl_3$.** — ⟨G.O.-E.⟩ — Thin ndl.
755	76.5–7	**Dichlorlactic Ac., $CHCl_2.CH(OH).CO_2H$.** — ⟨T. **4**.3⟩ — Deliq. tbl. — V.s. aq., alc., eth. — Red. ammon. $AgNO_3$ sol.! — Aq. sol. of NaĀ gives chloracetaldehyde & CO_2 on boiling.
760	76–7	**β,β-Dichloracrylic Ac., $CCl_2{:}CH.CO_2H$.** — ⟨T. **4**.3⟩ — V. volat. pr. fr. chlf. — D.s. aq.; v.s. eth., chlf. — Boiled w. baryta sol. gives HCl, CO_2 & C_2HCl. — Heated to 120°, slowly cooled to 60°, then rapidly, remelts at first @ 63–4°.
765	74–5; 78	**Butylchloral Hydrate, $Me.CHCl.CCl_2.CH(OH)_2$.** — ⟨G.O.-E⟩ — Trimet. lft. fr. aq. (M.p. dependent on rate of heating). — D.s. c. aq.; e.s. alc. — Dec. on distn. to α,α,β-trichlorbutyric ald. (b.p. 164–5°), & aq. — (Decd. by c. NaOH sol.)
770	76–7	**Chloralacetophenone, $CCl_3.CH(OH).CH_2.CO.Ph$.** — ⟨G.O.-E.⟩ — Monoclin. cryst. fr. lgr.
775	77	**Dichlorlevulinic Ac., $C_4H_5OCl_2.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst.

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
780	77–8	**Terephthalyl Chloride, p-$C_6H_4(COCl)_2$.** — ⟨T. 4.11⟩ — B.p. 259°. — Ndl.
785	75.5–6; 77–8	**4-Chlorbenzophenone, $Cl.C_6H_4.CO.Ph$.** — ⟨G.O.-E.⟩ — Boils undecd. above 300°. — Ndl. fr. eth., alc. — E.s. eth.; d.s. alc., c. lgr.
790	78	**i-Phenylchloracetic Ac., $Ph,Cl.CH.CO_2H$.** — ⟨T. 4.3⟩ — Tbl. — D.s. c. aq., lgr.; e.s. h. lgr.; v.s. alc., eth. — Boiled w. KOH sol. gives mandelic ac. (Vol. 1) — MeĀ: oil; b.p. 248°c., sl.d.
795	78	**β-Chlorlactic Ac., $CH_2Cl.CH(OH).CO_2H$.** — ⟨T. 4.3⟩ — Lust. pr. fr. eth. Not vol. w. st. — V.s. aq., alc., eth. — Boiling conc. aq. sol. of NaĀc. yields acetaldehyde, CO_2, & HCl. — Ba & Pb salts v.s. aq. — AgĀ: silky cryst. decg. w. boiling aq. to aldehyde, CO_2, & AgCl.
800	78	**α,β-Dichlorbutyric Ac., "Isocrotonic Ac. Dichloride," $Me.CHCl.CHCl.CO_2H$.** — ⟨T. 4.3⟩ — B.p. 131.5° (20 mm.). — Pr. — V.s. alc., eth.; less s. aq. — (Alc. KOH gives α-chlorcrotonic acids).
805	79	**3,5-Dichlorsalicylic Chloride, $Cl_2(HO).C_6H.COCl$, (COCl = 1)** — ⟨T. 4.11⟩ — Pr. — (Pat. Frdl. IV, 156).
810	80–81	**1,3-Dichlornaphthol-(2), $Cl_2.C_{10}H_5.OH$.** — ⟨G.O.-D.⟩ — Lust. ndl. fr. lgr. — E.s. alc., eth., bz. — Conc. HNO_3 oxid. to chlor-β-naphthoquinone: m.p. 172°.
	80–81	(Solid)**Acetone-Chloroform, $Me_2.C(OH).CCl_3 + 1/2\ H_2O$.** — ⟨G.O.-E.⟩ — Cf. m.p. 97°.
815	80	**s-Trichlor-tert.-butyl-carbinol, $(CH_2Cl)_3C.CH_2.OH$.** — ⟨G.O.-E.⟩ — B.p. 136° (12 mm.). — S. bz., pet-eth.
820	80	**Dichlordiphenylethylene, $Cl_2.C:CPh_2$.** — ⟨G.O.-E.⟩ — B.p. 316.5 (th.i); 336 c. — Large, flat monoclin. pr. fr. alc. — 100 pt. c. alc. (90%) dis. 11.9 pt.; e.s. eth., CS_2, chlf.; less s. bz. — H. conc. H_2SO_4 colors dark green; then violet-black!
825	80.5	**1,3,6-Trichlornaphthalene, $C_{10}H_5Cl_3$.** —
830	81	**1,2,3-(α)-Trichlornaphthalene, $Cl_3.C_{10}H_5$.** — Pr. fr. eth. alc.
835	82–3	**uns-Dichlor-β-hydroxyisobutyric Ac., $(CHCl_2).Me,C(OH).CO_2H$.** — ⟨G.O.-E.⟩ Pr.- S. eth.
840	82	**$1^1,1^1$-Dichlorcresol-(2), $Cl_2CH.C_6H_4.OH$.** — ⟨G.O.-D.⟩ — Pr. fr. eth. — V.d.s. c. alc.; v.s. eth., CS_2. — (Fr. salicylic ald. & PCl_5).
845	82–3	**3-Chlorbenzophenone, $Cl.C_6H_4.CO.C_6H_5$.** — ⟨G.O.-E.⟩ — Mic. ndl. — D.s. alc.
850	82	**2,4,5-Trichlortoluene, $Cl_3.C_6H_2.Me$.** — ⟨G.O.-E.⟩ — B.p. 229–30° (716 mm.). — Pr. fr. alc. — Oxid. to trichlorbenzoic ac. by CrO_3.
855	83	**Trichlorresorcinol, $Cl_3.C_6H.(OH)_2$.** — ⟨G.O.-D.⟩ — Fine ndl. — D.s. c. aq; e.s. alc, eth. — Sbl. w. decn. — Diacetyl deriv.: pr. f. alc; m.p. 116°.
860	83	(Solid) **Trichloracetale, $C_6H_{11}O_2Cl_3$.** — ⟨G.O.-E.⟩ — Vol. w. st.
865	83	**1,8-Dichlornaphthalene, $C_{10}H_6Cl_2$.** — ⟨G.O.-E.⟩ — Rhomb. cryst.
860	83; 83.5	**1,2,8-Trichlornaphthalene, $C_{10}H_5Cl_3$.** — ⟨G.O.-E.⟩ — Fine ndl. fr. alc.
865	84.5	**β-Chloracrylic Ac., $CHCl:CH.CO_2H$.** — ⟨T. 4.3⟩ — Lft.
870	84	(β)**-2,3,4-Trichlorbenzylidene Chloride, $Cl_3.C_6H_2.CHCl_2$.** — ⟨G.O.-E.⟩ — B.p. 275–85°.
875	84	**Triphenylchlorethane, $Ph.CHCl.CHPh_2$.** — ⟨G.O.-E.⟩ — Hexag. ndl.
880	85–6	**β-Chlor-α-hydroxybutyric Ac., $Me.CHCl.CH(OH).CO_2H$.** — ⟨T. 4.3⟩ — Pr. — V.s. aq., alc., eth. — (Alc.-KOH splits off HCl) — $Zn\bar{A}_2 + 2H_2O$: cryst., r.d.s. c. aq.
885	85–6	**Pentachlorbenzene, C_6HCl_5.** — ⟨G.O.-E.⟩ — B.p. 275–7° — Sp.gr. = 1.8342 (16.5°) — Ndl. fr. alc. — Alm. i. c. alc.; e.s. h. alc., eth., C_6H_6, CS_2. — Long heating w. conc. H_2SO_4 gives red dyestuff s. alk. w. red color.
890	85–6; 87–8	**α,β-Dichloracrylic Ac., $CHCl:CCl.CO_2H$.** — ⟨T. 4.3⟩ — Pr. fr. chlf. Vol. in air. — V.e.s. aq., alc., eth., chlf. — Adds Br_2 @ 100° to dibromide of m.p. 94–5°.

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
895	86	**β-Phenyl-β-hydroxy-α-chlorpropionic Ac., $Ph.CH(OH).CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst. fr. h. aq. in 6-sided lft. — S. c., v.s. h. aq. — **V. unstable**, losing HCl easily. — Na-amalgam gives phenyllactic ac.
900	86d.	**β-Naphthoquinonedichloride, $C_{10}H_6Cl_2O_2 + 2H_2O$.** — Cryst. — E.s. eth.; d.s. chlf. — (Fr. Cl. & β-naphthoquinone).
905	87–7.5c.	**(Cryst. polymeric) Chloraldehyde, $C_6H_9O_3Cl_3$.** — Ndl. fr. eth. — I. aq.; d.s. c. alc.; e.s. eth., h. alc. — V. stable. — On distn. changes to chloracetaldehyde.
910	88–9	**oo-Dichlortolane, $ClC_6H_4.C:C.C_6H_4Cl$.** — ⟨G.O.-E.⟩ — Rhomb. tbl. fr. alc. — Adds Cl_2 (giving α & β-dichlortolane dichlorides.
915	88; 76	**1,2,7-Trichlornaphthalene, $C_{10}H_5Cl_3$.** — ⟨G.O.-E.⟩ — Cryst. fr. gl. ac. ac. — E.s. alc.; v. s. bz.; s. h. gl. ac. ac. — (Refused, melts @ 84°.)
920	89	**Dichlordiphenyldichlorethylene, $(C_6H_4Cl)_2C:CCl_2$.** — ⟨G.O.-E.⟩ — Lust cryst. fr. alc.
925	88–89	**γ-Octochlorcyclohexanone, C_6Cl_8O.** — (Fr. chlorination of phenol in presence of $SbCl_5$).
930	89.5–90	**β-Octochlorcyclohexanone, C_6Cl_8O.** — As above.
935	89	**Hexachlor-2,5-cyclohexendione, $\ulcorner CO.CCl_2.CCl_2.CCl:CCl \urcorner$** — Boils @ 275–85° giving chloranile. Odor irritating! Vapor produces flow of tears! — E.s. eth., chlf.; mod. s. alc., bz. — E. red. by $SnCl_2$ to tetrachlorhydroquinone. — (Fr. chlorination of p-aminophenol).
940	89; 86	**$1^1,1^1,2^1,2^1$,-Tetrachlorxylene, $CHCl_2.C_6H_4.CH_2Cl_2$.** — ⟨G.O.-E.⟩ — B.p. 273–4°. — Cryst. fr. eth. — S. in 1 pt. eth. @ 15°. — Heated w. aq. @ 200° gives phthalid.
945	89.5; 87	**1,3,8-Trichlornaphthalene, $C_{10}H_5Cl_3$.** — ⟨G.O.-E.⟩ — Cryst. fr. alc. After solidfn. remelts @ 85°.
950	90	**Dulcitemonochlorhydrin, $C_6H_8O(OH)_3Cl$.** — ⟨G.O.-E.⟩ — Long ndl. — Misc., aq., alc., eth. — (Decd. by boiling aq. to HCl & dulcitan.)
955	90	**2,3,4-Trichlorbenzaldehyde, $Cl_3.C_6H_2.CHO$.** — Ndl. fr. alc.
960	90.5–1.	**2,3,6-Trichlornaphthalene, $C_{10}H_5.Cl_3$.** — Cryst. — D.s. c. alc.; e.s. eth., chlf., bz.
965	91–2	**s-Dichlor-α-hydroxyisobutyric Ac., $(CH_2Cl)_2.C(OH).CO_2H$.** — ⟨T. **4**.3⟩ — Clear deliq. tbl. — E.s. alc., eth.
970	92	**1,2,4-Trichlornaphthalene, $C_{10}H_5.Cl_3$.** — Ndl.
975	93	**$1^1,1^2$-Dichlorbenzylacetone, Ph.CHCl.CHCl.CO.Me.** — ⟨G.O.-E.⟩ — Ndl. fr. alc. — (Fr. Cl. & benzylideneacetone).
980	93–4	**β-Stilbene Chloride, PhCHCl.CHCl.Ph.** — ⟨G.O.-E.⟩ — Odor, pleasant, ormat. Tbl. fr. alc. — Sbl. — E.s. org. solv.; least in lgr. — Heated at 200° gives less sol. α-isomer: m.p. 192°.
985	93; 87	**p-Chlorphenyl Benzoate, $PhCO_2.C_6H_4Cl$.** — ⟨G.O.-E.⟩ — Cryst.
990	93	**$1^1,1^1,4^1,4^1$-Tetrachlorxylene, $(CHCl_2)_2.C_6H_4$.** — ⟨G.O.-E.⟩ — Sp.gr. = 1.606 @ 0°. — S. in 1 pt. h. eth., or 14 pt. lgr. — (Boiled w. aq. gives terephthalic ald.)
995	94–4.5	**β-Chlorcrotonic Ac., $Me.CCl:CH.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 206–11° sl.d. — Cryst. fr. CS_2. — S. in 32.2 pt. aq. @ 19° — Heated at 130° for 20 hr. changes mainly to β-chlorisocrotonic ac., No. **3**.640. — Heated w. 40.3 g. KOH in 100 cc. aq. sol. below 100° dec. to CO_2, acetone (Vol. I), & HCl. — $Ba\bar{A}_2$: octahedra s. in 2.2 pt. aq. @ 18°.
1000	94	**α-Chlorisocrotonyl Chloride, Me.CCl:CH.COCl.** — ⟨T. **4**.11⟩ — Distn. changes to α-chlorcrotonyl chloride, No. **3**.2575. — Amide: s. in 22 pt. aq. @ 15°; m.p. 99–101°.
1005	94	**p-Benzoylbenzoyl Chloride, $PhCO.C_6H_4.COCl$.** — ⟨T. **4**.11⟩ — Crusts. — E.s. chlf., bz. — Corresp. acid: lft. fr. h. aq; m.p. 194°. — Amide: m.p. 204°.
1010	94	**6-Chlornaphthol-(1), $ClC_{10}H_6.OH$.** — ⟨G.O.-D.⟩ — Long pr. fr. CS_2. — Picrate: or-red silky ndl; m.p. 165°.

No.	Melting-point (C.°).	**" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.**
1020	91–2; 96	**Tetrachlortoluene, $C_7H_4Cl_4$.** — ⟨G.O.-E.⟩ — B.p. 276.5°c. — Ndl. fr. alc. — *V.s.* CS_2, bz; less s. alc.
1025	95–6	**1,1,3-Trichlor-1,2-dihydronaphthenone-(2), ⌜$C_6H_4.CCl_2.CO.CCl{:}CH$⌝.** — Monoclin. cryst. fr. alc. — Reduced to 1,3-Dichlor-β-naphthol by SO_2. — (Fr. chlorination of β-naphthol).
1030	92.5; 97	**1,2,6-Trichlornaphthalene, $C_{10}H_5Cl_3$.** — Ndl. fr. alc.
1035	96–97; 97	**Trichlor-tert.-butyl Alc., "Chloretone," Acetone Chloroform, $Me_2C(OH).CCl_3 + 1\ 1/2\ H_2O$.** — Separates from solutions with 1/2 H_2O w. m.p. 80–81°. (Hypnotic drug). — B.p. 167°. — Cryst. of camphorous odor which rotate vigorously when thrown on aq.! I. c., mod. s. h. aq.; v.s. alc., eth. chlf., acetone, gl.ac.ac. — V. vol. w. st.! Sbl. in container at ordinary temp. in ndl.! — Reduces ammon.-Ag. sol. slowly in cold. — 5 cc. of 5% alc. sol. boiled w. 1–2 cc. NaOH sol. becomes turbid & contains acetone (Pharm. Ztg. **50** (1905), 1009). — (Cf. Aldrich, J. Biol. Chem. **34** (1918), 263, for detection of small quantities in sol.; and J. Lab. & Clin. Med. **4** (1919), 3, for detection in animal tissue.)
1040	96	**2,3-Dichlorbenzoquinone, $C_6H_2Cl_2O_2$.** — Luster yel. tbl.
1045	96–7	**1,1,3,4-Tetrachlor-1,2-dihydronaphthenone-(2), ⌜$C_6H_4.CCl_2.CO.CCl{:}CCl$⌝.** — Lft. fr. gl. ac. ac.
1050	97	**oo-Dichlorstilbene, $Cl.C_6H_4.CH{:}CH.C_6H_4.Cl$.** — ⟨G.O.-E.⟩ — B.p. abt. 220°. — Ndl. fr. abs. alc. — E.s. alc., eth., chlf., bz.; d.s. lgr. — (Not attacked by Na @ 190°.)
1055	97–8	**p-Benzoylbenzyl Chloride, $Ph.CO.C_6H_4.CH_2Cl$.** — ⟨G.O.-E.⟩ — Pr. — V.s. chlf., bz., h.alc. — Boiled w. $AgNO_3$ sol. gives AgCl.
1060	97	**1,1,1-Trichlor-2-methylpropanol-(2), $Me_2C(OH).CCl_3$.** — ⟨G.O.-E.⟩ — Cryst. of camphor-like odor wh. rotate on aq.! Sbl. easily. — I. c., mod. s. h. aq.
1065	97	**2,4-Dichlorphenyl Benzoate, $Cl_2C_6H_3.CO_2Ph$.** — ⟨G.O.-E.⟩ — Lft. fr. alc.
1070	97	**Cholesteryl Chloride, $C_{26}H_{43}Cl$ or $C_{27}H_{45}Cl$.** — ⟨G.O.-E.⟩ — Ndl. fr. alc. — D.s. alc.; c.s. eth. — (Unchanged by boiling conc. aq.-KOH).
1075	98; 99.5	**5-Chlorsalicylic Ald., $Cl.C_6H_3.(OH)\ (COH)$.** — Rt. angled tbl. fr. alc. — I. aq.; s. alc., eth., alk. — (Unites w. $NaHSO_3$).
1080	99.2	**α-Chlorcrotonic Ac., $Me.CH{:}CCl.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 212°. — Sbl. — S. in 47.1 pt. aq. @ 19°. V.s. alc., eth. — KA: lft. fr. alc., s. in 736.4 pt. alc. @ 16.5. — Chloride: (fr. PCl_5.) b.p. 142°. — Amide: lft., m.p. 107°, 112°; d.s. c. aq.
1085	100	**2-Chlorglutaric Ac., $CO_2H.CHCl.(CH_2)_2.CO_2H$.** — ⟨T. **4**.3⟩ — Sinters at 97°. — Cryst. fr. dry eth. — E.s. aq., alc., eth.; i. chlf., bz., lgr. — (In aq. sol. at 50° gives α-oxyglutaric ac. on standing).
1090	100	**$1^1,4^1$-Dichlorxylene, $CH_2Cl.C_6H_4.CH_2Cl$.** — ⟨G.O.-E.⟩ — B.p. 240–50°d. — Sp. gr. 1.417 @ 0°. — Lft. fr. alc. — (Boiled w. PbN_2O_6 sol. gives $CHO.C_6H_4.CO_2H$.)
1095	101	**8-Chlornaphthol-(2), $Cl.C_{10}H_6.OH$.** — ⟨G.O.-D.⟩ — B.p. 307–8°. — Ndl. — E.s. alc., eth.; less s. lgr.
1100	101	**1^2,4-Dichloracetophenone, $ClCH_2.CO.C_6H_4.Cl$.** — ⟨G.O.-E.⟩ — B.p. 270°. — Fine ndl. fr. alc. — Oxidn. yields p-chlorbenzoic ac., No. **3**.2110.
1105	101–3	**1,1,3,4-Tetrachlor-1,2,3,4-tetrahydronaphthenone-(2), $C_{10}H_6Cl_4O$.** — ⟨G.O.-E.⟩ — (Cryst. fr. aq. w. $1H_2O$ w. m.p. 90–91°). — Cryst. fr. lgr. — (In cold Na_2CO_3 sol. gives chlor-β-naphthoquinone).
1110	102–3	**Chlorstilbene Dichloride, $Ph.CHCl.CCl_2.Ph$.** — ⟨G.O.-E.⟩ — Hard colorless pr. — Alm. i. alc. — (Alc.-KOH gives α & β-tolanedichlorides).
1115	102–3	**(α)-Octochlorcyclohexenone, ⌜$CO.CCl{:}CCl.CCl_2.CCl_2.CCl_2$⌝.** — Dist. undecd. Inch-long lust. columns. — Reductn. gives pentachlorphenol.
1120	103	**Chloranthracene, $C_{14}H_9Cl$.** — Gold-yel. ndl. fr. [illegible] — E.s. eth., bz. — W. picric ac. gives comp. crystg. in scarlet ndl.!
1125	103	**1,3,5-(γ)-Trichlornaphthalene, $Cl_3.C_{10}H_5$.** — Pr. — E.s. h. alc. — (Fr. Cl. &

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
		α-nitronaphthalene, or 1,5-dichlornaphthalene-3-sulphonic ac. & PCl_5, Ber. **12**, 2230).
1130	103	**1^1,2,3,4,5,6-Hexachlortoluene, $CCl_5.CH_2Cl$.** — ⟨G.O.-E.⟩ — B.p. 325–27°. — Fine ndl. fr. bz. + alc. — I. c. alc.; d.s. h. alc.; e.s. h. eth.
✓ 1135	104; 105	**4-Chlorphenylacetic Ac., $Cl.C_6H_4.CH_2.CO_2H$.** — ⟨T. **4**.3⟩ — Fine ndl. fr. aq. — E.s. aq., bz.; more s. alc., eth. — Amide: tbl. fr. alc.; m.p. 175°; d.s. h. aq.
1140	104	**Tetrachlorbenzotrichloride, $Cl_4.C_6H.CCl_3$.** — ⟨G.O.-E.⟩ — B.p. 316°. — (Sl. decd. by aq. @ 270° to HCl & tetrachlorbenzoic ac.)
1145	104–5	**(α)-Tetrachlor-1,2-dihydronaphthenone-(1), Dichlor-α-naphthoquinone Chloride, ⌜$C_6H_4.CO.CCl_2.CCl:CCl$⌝.** — ⟨G.O.-E.⟩ — Rhombohedra s. h. alc. — (Boiling w. dil. alc. gives dichlor-α-naphthoquinone.)
1150	106–7	**β-Chlorhydroxybutyric Ac., $(CH_2Cl)Me.CH(OH).CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 230–5°. — Clear pr. fr. eth. — E.s. aq., alc., eth. — (Attacked by KOH). — NaĀ distd. w. aq. gives acetone.
1155	106	**Hexachlorcyclohexadienone, C_6Cl_6O.** — Tbl. or pr. fr. lgr. — I. aq., KOH.; d.s. c. alc.; more s. bz.; e. s. chlf. — W. CrO_3 in gl. ac. ac. gives pentachlorphenol. — W. conc. H_2SO_4 at 100° gives chloranil, No. **3**,2190. — (Fr. Cl & phenol w. $SbCl_5$).
1160	106; 103–4	**Chlorhydroquinone, $Cl.C_6H_3(OH)_2$.** — ⟨G.O.-D.⟩ — B.p. 263° (sl.d.). — Lft. — V.s. aq., alc., eth.; d.s. c. chlf.
1165	106; 107–8	**2,4-Dichlornaphthol-(1), $Cl_2.C_{10}H_5.OH$.** — ⟨G.O.-D.⟩ — Silky ndl. fr. alc. — Vol. w. st. — E.s. abs. alc., eth., bz. — Boiled w. dil. HNO_3 gives phthalic ac.
1170	106.5–7.5	**Methyl-5-chlor-2-nitrophenyllacticacidketone, $Cl(NO_2).C_6H_3.CH(OH).CH_2.CO.Me$.** — ⟨G.O.-E.⟩ — Monoclin. tbl. fr. dil. alc. — E.s. alc.; d.s. lgr.
1175	106–8	**Dichlorditolylmethane, $(ClCH_2.C_6H_4)_2.CH$.** — ⟨G.O.-E.⟩ — Lft. fr. MeOH + chlf. — Dist. — V.s. chlf.; e.s. MeOH, acetone.
1180	107	**1,5-(γ)-Dichlornaphthalene, $C_{10}H_6Cl_2$.** — ⟨G.O.-E.⟩ — Scales fr. alc. — Sbl. in broad thin pr. — Oxdn. by CrO_3 in gl.ac.ac. gives 3-chlorphthalic ac.
1185	108	**Pentachlorphenyl-Methyl-Eth. $Cl_5.C_6.OMe$.** — ⟨G.O.-E.⟩ — B.p. 289° (th.i., 745.5 mm.). — Sbl. easily. Long ndl. — E.s. alc.
1190	109.5	**1,6,7-Trichlornaphthalene, $C_{10}H_5Cl_3$.**
1195	109; 119	**1^1,1^1,2,3,4,5,6-Heptachlortoluene, $C_6Cl_5.CHCl_2$.** — ⟨G.O.-E.⟩ — B.p. 334°. — (Not attacked by aq. @ 300°). — Long flat lft. fr. alc. — E.s. h. alc.
1200	105–15	**Triphenylchlormethane, $Ph_3.C.Cl$.** — ⟨G.O.-E.⟩ — Cryst. — Dec. a. 250° to HCl, triphenylmethane, & phenylenediphenylmethane. — Boiling aq. dec. at once to HCl & triphenylcarbinol!
1205	110.5	**(Allo-)α-Chlorcinnamic Ac., $Ph.CCl:CH.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst. — S. in 312 pt. aq. @ 17°. — Heated in s.t. for 10 hr. @ 178° is 90% changed to stereoisomer of m.p. 139° (No. **3**.1462). — KĀ: S. in 3.58 pt. abs. alc. (Separation fr. stereomer).
1210	110	**1^1,1^1,1^1,4^1,4^1,4^1-Hexachlorxylene, $CCl_3.C_6H_4.CCl_3$.** — ⟨G.O.-E.⟩ — Cryst. fr. eth. — Boiled w. much aq. gives terephthalic ac. — (Fr. p-xylene + PCl_5 @ 200°.
1215	111–11.5	**p-Benzoylbenzotrichloride, $Ph.CO.C_6H_4.CCl_3$.** — ⟨G.O.-E.⟩ — Lft. fr. alc. — Sbl. — E.s. eth., chlf., h. alc. — Long boiling w. KOH sol. gives p-benzoylbenzoic ac.
1220	112–3; 110–1	**2,4,5-Trichlorbenzaldehyde, $Cl_3.C_6H_2.CHO$.** — Ndl. — Vol. w. st. — I. h. aq.; e.s. alc., eth., bz., chlf.
1225	112	**p-Dichlorbibenzyl, $Cl.C_6H_4.CH_2.CH_2.C_6H_4Cl$.** — ⟨G.O.-E.⟩ — Lft. fr. alc. — Dist. undecd. — E.s. warm alc., eth., chlf. — Oxdn. gives p-chlorbenzoic ac., No. **3**.2110.
1230	112.5–13	**1,3,7-Trichlornaphthalene, $C_{10}H_5Cl_3$.** — Ndl. fr. gl.ac.ac. — Vol. w. st. — E.s. warm alc.; v.s. bz. — (Fr. 1-nitronaphthalene-3,7-disulphonyl chloride, or 2-chlornaphthalene-6,8-disulphonic ac. & PCl_5).
1235	112 (losing cryst. aq.)	**Trichlorketohydronaphthalene, ⌜$C_6H_4.CHCl.CCl_2.CO.CO$⌝ + $2H_2O$.** — Cryst. fr. gl.ac.ac. — (Fr. Cl & β-naphthaquinone).

No.	Melting-point (C.°).	“ ADDITIONAL ELEMENT ” — CHLORINE. — SOLIDS.
1237	114–5 (Dried on water bath)	**Chlormaleic Ac., $CO_2H.CH:CCl.CO_2H$.** — ⟨T. **4**.3⟩ — (M.p. varies widely w. method of drying, cryst. fr. aq. sol., softening fr. 45°). — Cryst. fr. chlf. + gl. ac. ac. — E.s. alc, eth, gl. ac. ac.; d.s. chlf., bz.; i. pet.-eth. — Evapn. w. conc. HCl gives chlorfumaric ac. (No. **3**.1942). — $Me_2\bar{A}$: B.p. 235° (sl. d.).
1240	114.5	**2,3,4,6-Tetrachlorphenyl Benzoate, $PhCO_2.C_6HCl_4$.** — ⟨G.O.-E.⟩ — Pr.
1245	114.5	**Chloralid, $\ulcorner CH(CCl_3).CO_2.CH(CCl_3).O \urcorner$.** — ⟨G.O.-E.⟩ — B.p. 272–3. — Monoclin. pr. fr. eth. — I. aq.; d.s. c. alc.; e.s. eth. — Boiled w. KOH sol. gives chlf. & formic ac. — (Fr. fuming sulph. ac. & chloral).
1250	114	**2,7-(δ)-Dichlornaphthalene, $Cl_2.C_{10}H_6$.** — ⟨G.O.-E.⟩ — Large tbl. — E.s. h. alc. — (Oxdn. by dil. HNO_3 @ 140° gives chlorphthalic ac.). — (Fr. 2,7-naphthalenedisulphonic ac., or 2-naphthylamine-7-sulphonic ac. & PCl_5.) (Bull. Chim. **26**. 244; Ber. **20**, 1432.).
1255	115	**6-Chlornaphthol-(2), $Cl.C_{10}H_6.OH$.** — Fine ndl. fr. aq. — E.s. alc., eth. — Oxdn. gives 3-chlorphthalic ac.
1265	115.5	**(β)-Tetrachlor-1,2-dihydronaphthenone-(1), Dichlor-α-naphthoquinone Chloride, $\ulcorner C_6H_4.CO.CCl_2.CCl:CCl \urcorner$.** — Rhomb. cryst. fr. eth. quickly becoming amethyst colored in light, but losing color in the dark!
1270	115	**Chlorfluorenone, $\ulcorner C_6H_3Cl.C_6H_4.CO \urcorner$.**
1275	116	**4-Chlornaphthol-(1), $Cl.C_{10}H_6.OH$.** — ⟨G.O.-D.⟩ — Sbl. in long ndl. — E.s. alc. — $FeCl_3$ gives blue ppt. in neut. sol. — Picrate; m.p. 171°.
1280	117–8	**2-Chlor-α-naphthoquinone, $C_{10}H_5ClO_2$.** — *Lust. gold-yel. ndl.* fr. alc.! — E.s. alc., bz.; d.s. eth. — W. aniline gives chloraniline-α-naphthoquinone, $C_{10}H_4ClO_2.NHC_6H_5$, m.p. 202–3°.
1285	117	**2,4,6-Trichlor-1,3-dimethylbenzene, $Cl_3.C_6H.Me_2$.** — ⟨G.O.-E.⟩ — Lust. ndl. fr. alc. — E.s. eth., chlf., bz.
1290	118–9	**Chlorpyrene, $C_{16}H_9Cl$.** — Long flat lust. *golden* ndl.! — V.s. eth., chlf., bz., CS_2; e.s. alc., warm lgr. — Sol. in oil of vit. w. violet-blue fluoresc.! — $\bar{C}$.Pk: ndl, m.p. 177–8°; e.s. h. alc., free chlorpyrene septg. on cooling.
1294	119–20	**Dichlormaleic Ac., $CO_2H.CCl:CCl.CO_2H$.** — ⟨T. **4**.3⟩ — Ndl. fr. lgr. + eth. — E.s. aq.; s. alc., eth; è. chlf., bz. — (In melting forms anhydride (m.p. 119–20°)). — $Ag_2\bar{A}$: ndl; explodes on heating.
1295	119–20	(low-melting) **Citradichlorpyrotartaric Ac., $Me.CCl(CO_2H).CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst. fr. bz. — Distn. gives citraconic anhydr. — (Attacked by c. KOH sol.)
1300	120	**2,6-Dichlorbenzoquinone, $C_6H_2Cl_2O_2$.** — Inch long straw yel. trimet. pr. fr. alc. — Sbl. easily. — Vol. w. st. — D.s. h. aq., c. alc.; e.s. h. alc.; s. chlf. — m-Nitraniline deriv., $\bar{C} + C_6H_4(NO_2).NH_2$: pr. w. intense met-green lust. fr. bz.; m.p. 112°. (Ann. **228**, 325).
1302	120–1	**α,β-Dichlorcinnamic Ac., $Ph.CCl:CCl.CO_2H$.** — ⟨T. **4**.3⟩ — Lft. fr. chlf. + lgr. — E.s. alc., eth.; i. lgr.
1305	120–1	**2,4,4-Trichlordihydronaphthenone-(1),Chlor-α-naphthoquinone Chloride, $\ulcorner C_6H_4.CO.CCl:CH.CCl_2 \urcorner$.** — ⟨G.O.-E.⟩ — Clear monoclin. pr. — E.s. gl. ac. ac.; d. s. alc. — Boiling w. dil. alc. gives chlor-α-naphthoquinone. — (Fr. Cl & α-naphthol in gl. ac. ac. sol.)
1310	120	**2,3-Dichlornaphthalene, $C_{10}H_6Cl_2$.** — ⟨G.O.-E.⟩ — Thin lft. — D.s. c., e.s. h. alc.; e.s. eth.
1320	122	**Tetrachlorcyclohexenone, $C_6H_2Cl_4O$.** — ⟨G.O.-E.⟩ — Glassy cryst. fr. eth. + lgr. — Conc. KOH sol. colors cryst. blue! — Warming w. alk. gives trichlorphenol. — Warmed w. conc. H_2SO_4 gives HCl, trichlorphenol & chloranil.
1325	122–3	**1,4-Dichlornaphthol-(2), $Cl_2.C_{10}H_5.OH$.** — ⟨G.O.-D.⟩ — Asbestos like ndl. fr. lgr. — E.s. alc., eth.
1330	123	**(high-melting)-Mesodichlorpyrotartaric Ac., $Me.CCl(CO_2H).CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — Pr. — E.s. aq.; d.s. c. bz. — Heated w. aq. on aq. bath gives propionic ald., etc. — (Attacked by alc-KOH).

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
1335	123	**7-Chlornaphthol-(1),** $Cl.C_{10}H_6.OH$. — Ndl. fr. CS_2. — D.s. h. aq. — Picrate: silky or.-red ndl.; m.p. 139°.
1340	124; 115–18; 105–10	**Trichlorlactic Ac.,** $CCl_3.CH(OH).CO_2H$. — ⟨T. **4**.3⟩ — Cryst. w. XH_2O. (M.p. 124° is for water-free comp.) — E.s. aq., alc., eth., chlf. — Alkali splits to chlf. & formic ac. — Boiled w. ac. anhydr. gives acetyl deriv., cryst. fr. bz., m.p. 65°.
1345	125	**6,8-Dichlornaphthol-(2),** $Cl_2.C_{10}H_5.OH$. — Ndl. fr. aq. Sbl. (sl.d.) — E.s. alc., eth.
1350	125–5.5; 126.5	**1,4-Dichlorbutandiol-(2,3), Erythrite Dichlorhydrin,** $CH_2Cl.CH(OH).CH(OH).CH_2Cl$. — ⟨G.O.-E.⟩ — E.s. alc. — (Fr. natural erythrite & HCl).
1355	128	**5-Chlornaphthol-(2),** $Cl. C_{10}H_6.OH$. — Ndl.
1360	128	**2,5,2',5'-Tetrachlorbenzophenone,** $(C_6H_3Cl_2)_2CO$. — Tbl. fr. alc. — E.s. h. alc., pet.-eth.
1365	129–30	**Tetrachlor-o-quinone,** $C_6Cl_4O_2$. — *Deep red* cryst. powd.! — I. aq.
1370	129	**2,3,4-Trichlorbenzoic Ac.,** $Cl_3.C_6H_2.CO_2H$. — ⟨T. **4**.3b.⟩ — Ndl. — S. h. aq
1375	129; 129–30	**Citrachlorpyrotartaric Ac.,** $Me.CCl(CO_2H).CH_2.CO_2H$. — ⟨T. **4**.3⟩ — Boiling w. aq. dec. to HCl & mesaconic ac.; w. alk., to HCl, CO_2 & methacrylic ac.
1380	129–30	**Paradichloracetaldehyde,** $(Cl_2CH.CHO)_x$ — ⟨G.O.-E.⟩ — Sbl. @ 210–20° w. part. depolymerization. — Pyramids. — E.s. h. alc.; v.d.s. h. aq. — W. conc. H_2SO_4 @ 240–45° yields dichloracetaldehyde.
1385	129	**β-oo-Dichlortolane Dichloride,** $C_6H_4Cl.CCl{:}ClC.C_6H_4Cl$. — B.p. 353–6°. — Tbl. fr. lgr. — 100 pt. lgr. dis. 1.9881 pt. — Ignitn. w. Zn dust gives oo-dichlortolane.
1390	130	**4-Chlor-o-toluic Ac.,** $Cl(Me).C_6H_3.CO_2H$. — ⟨T. **4**.3b.⟩ — Thick pr. fr. alc.
1395	126.5; 132–3	**2,6-Dichlorbenzoic Ac.,** $Cl_2.C_6H_3.CO_2H$. — ⟨T. **4**.3b.⟩ — Ndl. — BaĀ .3 1/2 Aq: Ndl. — 100 pt. aq. dis. 4.7 pt. anhyd. salt @ 4°. — Chloride: b.p. 244°. — Amide: ndl., m.p. 166°.
1400	130–1	**Camphoronyl Chloride,** $C_9H_{11}O_4Cl$. — ⟨T. **4**.11⟩ — Ndl. fr. abs. eth. — D.s. h. aq.; more s. alc., warm eth. — Boiling w. aq. gives camphoronic ac.
1402	131–2	**Trichloracetylacrylic Ac.,** $Cl_3C.CO.CH{:}CH.CO_2H$. — ⟨T. **4**.3⟩ — Lust. lft. fr. h. aq. — D.s. c., e.s. h. aq; e.s. chlf, bz. — Vol. w. st. — Boiled w. $Ba(OH)_2$ sol. gives chlf. & maleic ac. — Adds Br_2. — (Fr. bz. & ClO_2).
1405	131.5	**5-Chlornaphthol-(1),** $Cl.C_{10}H_6.OH$. — Ndl. fr. aq.; lft. fr. CS_2. — Picrate: C̄ + Pk Ac: red ndl.! m.p. 160°. — Acetate: m.p. 53°.
1410	131.5	**α-Chlornaphthalene Tetrachloride,** $C_{10}H_7Cl.Cl_4$. — ⟨G.O.-E.⟩ — Monoclin. pr. fr. chlf. — Oxidn. w. HNO_3 gives phthalic ac. — Boiled w. alc. — KOH gives α-trichlornaphthalene.
1415	131	**Trichlorbenzophenone,** $Cl_3.C_6H_2.CO.Ph$. — ⟨G.O.-E.⟩ — Hexag. pr. fr. acetone.
1420	131	**1,4,5-(δ)-Trichlornaphthalene,** $Cl_3.C_{10}H_5$. — Ndl. — E.s. w. alc. — Oxidn. by HNO_3 gives dichlorphthalic ac.
1425	132–3	**Anthraquinonechloride, Dichloranthione,** $\ulcorner C_6H_4.CO.C_6H_4.CCl_2 \urcorner$ — ⟨G.O.-E.⟩ — Lust. monoclin. pr. — R.d.s. eth., lgr.; e.s. chlf., bz. — Dec. on contact w. aq. or heating w. alc. to HCl & anthraquinone!
1427	132.5	**β-Chlorcinnamic Ac.,** $C_6H_5.CCl{:}CH.CO_2H$. — ⟨T. **4**.3⟩ — Lust. lft. fr. aq. — S. in 2789 pt. aq. @ 16°; e.s. alc., eth, chlf. — KĀ: s. in 1.2 pt. abs. alc. @ 20°. — Heated @ 170° for 5 hr. is 76% changed to stereomer of m.p. 143°.
1430	133	**Chlormalonic Ac.,** $CO_2H.CHCl.CO_2H$. — ⟨T. **4**.3⟩ — Cryst. — E.s. aq., alc., eth. — Dec. @ 180° to CO_2 & chloracetic ac. — (Me_2Ā: b.p. 206–8°).
1435	134	**2,3,5-Trichlorhydroquinone,** $Cl_3.C_6H.(OH)_2$. — Pr. — S. in 160 pt. aq. @ 15°; v.s. alc., eth. — Sbl. in lft. — Alk. sol. turns brown in air! — Diacetate: sbl. in ndl.; m.p. 153°.
1440	134 (Aq.-free)	**Trichlorphloroglucinol,** $Cl_3.C_6(OH)_3$. — Cryst. w. $3H_2O$. — Alm. i. c. aq., bz.; s. alc. — Warmed w. dil. HNO_3 gives oxalic ac.
1445	135	**2,6-Dichlornaphthalene,** $C_{10}H_6Cl_2$. — ⟨G.O.-E.⟩ — B.p. 285° — Monoclin.

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
		tbl. fr. eth. & bz. — D.s. alc.; e.s. eth., chlf., bz. — Oxdn. w. CrO_3 in ac. ac gives dichlornaphthoquinone, m.p. 149°.
1450	136; 123	**2,3,3-Trimethyl-2-chlorbutane, $Me_2CCl.CMe_3$.** — ⟨G.O.-E.⟩ — B.p. 130° — Odor camphorous. — Gives AgCl ppt. at once w. $AgNO_3$.
1455	137.5	**1,2,3,4,5,6-Hexachlorhexane, Mannite Hexachlorhydrine, $CH_2Cl.(CHCl)_4.CH_2Cl$.** — ⟨G.O.-E.⟩ — B.p. 180–5° (30 m.m.). — Pearly scales fr. lgr. — $(\alpha)_D$ in benzol sol. = + 18°, 32′.
1460	137–8; 137.5; 140–1	**1,2,4,5-(s)-Tetrachlorbenzene, $C_6H_2Cl_4$.** — ⟨G.O.-E.⟩ — B.p. 243–6°(th.i.) — Sp.gr. = 1.734 (10°). — I. c. alc.; d.s. h. alc.; mod.s. c. bz., eth., or CS_2. — Persistent heating s. conc. H_2SO_4 gives a dyestuff.
1462	139	**α-Chlorcinnamic Ac., $Cl.C_6H_4.CH{:}CH.CO_2H$.** — ⟨T. **4**.3⟩ — Ndl. — S. in 4230 pt. aq. @ 16°; e.s. alc., eth.; d.s. lgr. — KĀ: lft.; S. in 638 pt. abs. alc. @ 20°. (Dif. fr. stereomer, No. **3**.1205.)
1465	139–40	**Trichloracetylpentachlorbutyric Ac., $CCl_3.CO.CCl_2.CHCl.CCl_2.CO_2H$.** — ⟨T. **4**.3⟩ — Lust. ndl. — E.s. alc., eth., h. bz.; less s. lgr. — Warmed w. aq. splits to CO_2, HCl & tetrachlordiketo-R-pentene. — Disd. in NaOH sol. gives pentachlorglutaric ac. & chlf.! Separates I fr. KI sol.! — MeĀ: m.p. 68°; pearly lft. fr. dil. ac. ac. — (Fr. resorcinol & Cl).
1470	139.5–40; 140; 137	**o-Chlorbenzoic Ac., $Cl.C_6H_4.CO_2H$.** — ⟨T. **4**.3b⟩ — Ndl. — S. in 881 pt. @ 0°. E.s. h. aq.; e.s. alc., eth. — Melts under aq. — $Ba\bar{A}_2$. 3 Aq.; when anhydrous, s. 100 pt. aq. @ 18° dis. 31.2 pt. — AqĀ: scales fr. boiling aq. — Amide: m.p. 139°; ndl. fr. aq.; e.s. h. aq.; v.d.s. c. aq. — p-Toluide: m.p. 131°; e.s. alc.; i. aq. — Chloride: b.p. 235–8°.
1475	140–1	**Itachlorpyrotartaric Ac., $CH_2Cl.CH(CO_2H).CH_2.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 225–30° sl.d. — Warts fr. aq. — (W. KOH sol. gives itamalic ac.)
1480	141–2	**β-Phenyl-β-chlor-α-hydroxypropionic Ac., $Ph.CHCl.CH(OH).CO_2H$.** — ⟨T. **4**.3⟩ — Ndl. fr. Chlf. — E.s. alc., eth.; d.s. c. chlf., bz. — Boiled w. aq. gives HCl, CO_2 & phenylacetaldehyde.
1485	140	**Tetrachlorphthalyl Tetrachloride, $\ulcorner C_6Cl_4.CCl_2.CCl_2.O\urcorner$.** — ⟨T. **4**.4a.⟩ — Lust. rhombohedra e.s. eth. — (Strongly at. by alc. KOH).
1490	142	**Urochloralic Ac., $C_8H_{11}O_7Cl_3$(?).** — ⟨T. **4**.3a.⟩ — (In urine after use of chloral). — Silky ndl., not vol. w. st. — V.s. aq., alc. — Reacts strongly acid. — Red. h. $AgNO_3$ sol. & Fehling's sol.! — Salts: alm. all s. aq.; i. abs. alc.
1495	144 sl.d.	**Perchlordiethyl Oxalate, $C_2O_4(C_2Cl_5)_2$.** — ⟨G.O.-E.⟩ — Tabl. — I. aq. — Dec. @ 280° to phosgene, trichloracetyl chloride & CO. — Boiled w. KOH sol. gives oxalic ac., chlf., etc.
1497	143; 142	**(Allo-)-β-Chlorcinnamic Ac., $C_6H_5.CCl{:}CH.CO_2H$.** — ⟨T. **4**.3⟩ — Ndl. fr. dil. alc. — S. in 5396 pt. aq. @ 16°; s.alc, eth, chlf; d.s. lgr. — KĀ: S. in 386 pt. abs. alc. @ 20°. Heated w. 5 pt. aq. for 10 min. is completely decd. to phenylacetylene.
1500	143	**α-Tolane Dichloride, $Ph.CCl{:}PhCCl$.** — B.p. 183° (18 mm.) — Rhomb. tbl. fr. alc. — 100 pt. abs. alc. @ 24.4° dis. 0.71 pt. — E.s. eth. — Alk.-KOH @ 180° gives tolane. Does *not* add Br. in eth sol. — Heat partially converts to β-stereoisomer: m.p. 63°.
1505	143	**Hexachlornaphthalene, $C_{10}H_2Cl_6$.** — 6-sided pr. Dist. undecd. — Alm. i. alc.; s. in 20 pt. eth.
1510	144–5	**2,3-Dichlorhydroquinone, $Cl_2.C_6H_2.(OH)_2$.** — ⟨G.O.-D.⟩ — Ndl. fr. aq. Sbl. — E.s. alc.; i. c. lgr. — W. MnO_2 & dil. H_2SO_4 gives 2,3-dichlorquinone.
1515	145	**Dichlorphenanthrene Tetrachloride, $Cl_2.C_{14}H_8.Cl_4$.** — ⟨G.O.-E.⟩ — Cryst. — E.s. alc., eth., bz. — Dec. by heat or alc.-KOH to HCl & tetrachlorphenanthrene.
1520	146	**Benzoquinone Dichloride, $\ulcorner CH{:}CH.CO.CHCl.CHCl.CO\urcorner$.** — ⟨G.O.-E.⟩ — Tbl. fr. gl. ac.ac. — Sbl. — S. 30 pt. c. chlf.; d.s. eth.; s. (undecd.) in warm fuming HNO_3. — Decd. at once by alk. — Aq.-SO_2 gives 2,3-dichlorhydroquinone, (No. **3**.1510).
1525	146	**α-Chlorbenzenehexachloride, $C_6H_5Cl_7$.** — ⟨G.O.-E.⟩ — Sbl. — Cryst. fr. alc. — Mod. s. alc., lgr.; e.s. bz. — Alc.-KOH gives HCl & 1,2,3,5-tetrachlorbenzene (No. **3**.425). — Reduction w. Zn dust in alc. gives chlorbenzene.

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
1527	147	**Trichlorfluorene, $C_{13}H_7Cl_3$.** — Lft. — D.s. alc., eth.
1528	147–8	**4′-Chlorbenzophenone-2-carbonic Ac., $Cl.C_6H_4.CO.C_6H_4.CO_2H$.** — ⟨T. **4**.3b⟩ — Cryst. fr. bz. — V.d.s. h. aq; e.s. c. alc, eth, h.bz.
1530	147.7; 144–5	**4,4′-Dichlorbenzophenone, $(C_6H_4Cl)_2CO$.** — ⟨G.O.-E.⟩ — B.p. 353° — Lft. fr. alc. — E.s. h. alc., eth., CS_2.
1535	148–9	**Dichlor-α-naphthoquinone, $C_{10}H_6Cl_2O_2$.** — Sbl. in *deep yel.* ndl.!
1540	148–9	**1,2,3,4-Tetrachloranthracene, $C_6H_4.C_2H_2.C_6Cl_4$.** — Pptd. fr. chlf. sol. by alc. in fine ndl. — V.d.s. alc., eth.; e.s. chlf., bz. — Oxid. by CrO_3 in ac.ac. to α-tetrachloranthraquinone.
1545	148	**p-Dichlorbiphenyl, $(Cl.C_6H_4.)_2$.** — ⟨G.O.-E.⟩ — B.p. 315° — Oxid. to p-chlorbenzoic ac. (No. **3**,2110) by CrO_3 in gl. ac.ac.
1550	149–50	**Dichloranthracene Dichloride, $\ulcorner C_6H_4.CCl_2.C_6H_4.CCl_2 \urcorner$.** — ⟨G.O.-E.⟩ — (Fr. Cl & anthracene in chlf. sol.) — Pr. fr. chlf. — E.s. chlf., bz.; d.s. alc., eth. — (Boiled w. alc.-KOH gives anthraquinone.)
1555	150; 148	**4-Chlor-o-phthalic Ac., $Cl.C_6H_3.(CO_2H)_2$.** — ⟨T. **4**.3b⟩ — Silky ndl. fr. alc. — E.s. aq., alc. — $Me_2\bar{A}$: ndl. fr. lgr.; m.p. 37°.
1560	150	**Dichlortoluene Hexachloride, $Me.C_6H_3Cl_2.Cl_6$.** — ⟨G.O.-E.⟩ — Pr. fr. CS_2. — D.s. c. alc.; v.s. warm CS_2. — Alc.-KOH @ 110° gives tetrachlortoluene, b.p. 280–90°, & dichlorbenzoic ac., m.p. 203°.
1565	150	**Ditolane Hexachloride, $Ph.CCl_2.CClPh.CClPh.CCl_2.Ph$.** — Warts fr. bz. — D.s. alc., eth.; e.s. bz. — Gives α & β-tolane dichlorides on distn.
1570	151.5–2; 153–4	**d,l-Chlorsuccinic Ac., $CO_2H.CH_2.CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst. fr. aq. — E.s. aq.; v.d.s. chlf. — 2.3 cc. aq. sol. @ 20° contains l. g.
1575	151	**2,2-Dimethyl-3,3-dichlorbutane, $Me_3.C.CCl_2.Me$.** — ⟨G.O.-E.⟩ — Volat. at room temp.
1580	152–3	**2-Chlor-α-naphthoic Ac., $Cl.C_{10}H_6.CO_2H$.** — ⟨T. **4**.3b⟩ — S. in 1000 pt. aq. @ 20° or in 126 pt. @ 100°; e.s. alc., eth. — $Me\bar{A}$: pr. fr. alc. + toluene; m.p. 50°.
1585	152	(β)-**Tetrachloranthracene, $C_{14}H_6Cl_4$.** — *Yel.* ndl. fr. gl.ac.ac.! — V.d.s. alc.; more s. h. gl.ac.ac., — Oxid. by CrO_3 in ac.ac. gives a cryst. dichloranthraquinone.
1590	152–3	**β-Dichlor-α-naphthoquinone, $C_{10}H_6Cl_2N_2$.** —
1595	152; 153; 154–5; 158	**m-Chlorbenzoic Ac., $Cl.C_6H_4.CO_2H$.** — ⟨T. **4**.3b⟩ — Pr. — S. in 2 40 pt. (0°). — Amide: ndl.; m.p. 132–3°; 134.5°; e.s. h. aq. — Chloride: b.p. 225°; 222°. — $Me\bar{A}$: m.p. + 21°.
1600	153–5	**"Viferral," (Chloral Polymer), $(C_2HOCl_3)_x$.** — ⟨G.O.-E.⟩ — Sinters fr. 150°. (A hypnotic). — E.s. h. aq. forming chloral hydrate. — W. KOH gives chloroform & formic ac.
1605	154; 156	**6-Chlor-o-toluic Ac., $Cl,Me.C_6H_3.CO_2H.(Me = 1)$.** — ⟨T. **4**.3b⟩ — Ndl. — E.s. alc. — Oxdn. by $KMnO_4$ gives 3-chlorphthalic Ac. — $Ca\bar{A}_2.2H_2O$: pr.; s. h. aq.
1610	155–5.5	**3-Chlor-p-toluic Ac., $Cl,Me.C_6H_3.CO_2H,(Me = 1)$.** — ⟨T. **4**.3b⟩ — Ndl. — E.s. alc., eth., chlf., h. bz. — Amide: glassy cryst. fr. alc.; m.p. 182°.
1615	156	**2,5-Dichlorbenzoic Ac., $Cl_2.C_6H_3.CO_2H$.** — ⟨T. **4**.3b⟩ — B.p. 301°. — Fine ndl. fr. aq. — S. in 1193 pt. aq. (11°). — Sl. vol. w. st. — $Ba\bar{A}_2$.3 1/2 aq: s. in 2.513 pt. aq. @ 14.4°. — $Et\bar{A}$: b.p. 271°(th.i.). — Amide: wooly ndl.; s. boiling aq.; m.p. 155°. — Anilide: m.p. 240°.
1620	156–7	**2,2,3,4,4-Pentachlortetrahydronaphthenone-(1), $C_{10}H_5Cl_5O$.** — ⟨G.O.-E.⟩ — Clear monoclin. tbl. fr. bz. — Ds. alc.; alm. i. eth.; e.s. h. bz. — Loses HCl above 200°. — (Fr. α-naphthol & Cl).
1625	157	**trans-Benzene Hexachloride, $C_6H_6Cl_6$.** — ⟨G.O.-E.⟩ — B.p. 288°, decg. to HCl & 1,2,4-trichlorbenzene. — Sp.gr. = 1.87 @ 20°. - Vol. w. st. — S. @ 15.25° in 22.8 pt. chlf. & @ 18.25° in 15.4 pt. bz. — Not at. by h. conc. H_2SO_4. — Alc.-KOH gives HCl & α-trichlorbenzene.
1630	157–8	**1,4,5-Trichlornaphthol-(2), $Cl_3.C_{10}H_4.OH$.** — ⟨G.O.-D.⟩ — Short ndl. — Acetyl deriv.: m.p. 129°.

No.	Melting-point (C.°).	“ ADDITIONAL ELEMENT ” — CHLORINE. — SOLIDS.
1635	158	**2,4-Dichlorbenzoic Ac., $Cl_2.C_6H_3.CO_2H$.** — ⟨T. **4**.3b⟩ — Sbl. in long ndl. — V.s. alc. — $Ba\bar{A}_2$.3 1/2 Aq: long ndl.
1640	159–60	**Pentachlorphenyl Benzoate, $PhCO_2.C_6Cl_5$.** — ⟨G.O.-E.⟩ — Monoclin. pr. — V.d.s. alc., lgr. — Sp.gr. 1.711 (18°).
1645	159–60	**Octochlorcyclohexadiene-(1,4).** — Triclin. pr. — D.s. c. abs. alc., lgr.; s. eth., chlf., bz. — Fuming H_2SO_4 gives chloranil & C_6Cl_6. — Slowly s. in H_2SO_4 containing pyrosulphuric ac. w. fine red-violet color.
1647	160; 159	**2,3-Dichlor-2,3-dimethylbutane, $Me_2.CCl.CCl.Me_2$.** — ⟨G.O.-E.⟩ — Odor, camphor-like. — (Fr. pinacone + HCl).
1650	160	**Tetrachlor-α-naphthoquinone, $C_{10}H_2Cl_4O_2$.** — Long lust. *yellow* ndl. fr. alc.! — Sbl. undecd. — S. alk. — Heated w. conc. HNO_3 in tube gives tetrachlorphthalic ac.
1655	160	**2,4,6-Trichlorbenzoic Ac., $Cl_3.C_6H_2.CO_2H$.** — ⟨T. **4**.3b⟩ — Ndl. — Chloride: b.p. 275° (stable to aq.). — Amide; tbl.; s. h. aq.
1660	160	**Perchlorpropane, C_3Cl_8.** — B.p. 268–9° (734 mm.). — Leafy cryst. mass. — V.s. alc., eth., lgr. — Dec. at 300° to $CCl_4 + C_2Cl_4$.
1665	160	**2,3-Dimethyl-2,3-dichlorbutane, $Me_2.CCl.CCl.Me_2$.** — ⟨G.O.-E.⟩ — Cryst.
1670	161	**2,5-Dichlorbenzoquinone, $C_6H_2Cl_2O_2$.** — *Dark yel.* monoclin. tbl.! Melts to dark red-br. liq. — Vol. w. st. — I. aq.; alm. i. c. alc.; e.s. h. alc.; s. eth., chlf. — Sol. in x. s. KOH sol. Septg. red pr. of K salt after long standing. — m-Nitraniline deriv.: $\bar{C} + 2C_6H_4(NO_2)NH_2$; lust. greenish cryst. fr. bz.; m.p. 110°.
1675	161	**1,2-(α)-Dichloranthraquinone, $C_6H_2Cl_2.(CO)_2.C_6H_4$.** — Ndl. — Pptd. fr. chlf. sol. by alc. — NaOH fusion gives alizarine (Vol. I).
1680	162–3	**Trichloranthracene, $C_{14}H_7Cl_3$.** — *Yel.* ndl. fr. alc. — Alc. sol. fluoreses blue.
1685	162	**1,3,4-Trichlornaphthol-(2), $Cl_3.C_{10}H_4.OH$.** — ⟨G.O.-D.⟩ — Ndl. — Oxid. to v-dichlor-β-naphthoquinone by conc. HNO_3.
1690	163	**2,3,5-Trichlorbenzoic Ac., $Cl_3.C_6H_2.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. — E.s. h. aq. — $Et\bar{A}$: liq. — Chloride: m.p. 36°. — Amide: ndl. fr. dil. ac.ac.; m.p. 204–5°.
1695	163	**2,4,5-Trichlorbenzoic Ac., $Cl_3C_6H_2.CO_2H$.** — ⟨T. **4**.3b.⟩ — Sm. ndl. fr. h. aq. — Sbl. in long fine ndl. — Alm. i. c. aq.; e.s. c. alc. — $Ba\bar{A}_2$.7Aq.: fine ndl.; s. h. aq. — $Et\bar{A}$: ndl.; m.p. 65°. — Chloride: m.p. 41°. — Amide: ndl. fr. bz.; d.s. h. aq.; m.p. 167.5°.
1700	163	**1-Chloromethyl-2-hydroxybenzoic-(3) Ac., (MeO) (HO).$C_6H_3.CO_2H$.** — ⟨T. **4**.3b.⟩ — Scales. — (D.R.P., 113,723). — $Me\bar{A}$: (fr. $\bar{C}$,HCl & MeOH) m.p. 68°.
1705	163	**Tolane Tetrachloride, $Ph.CCl_2.CCl_2.Ph$.** — Rhomb. pyr. w. adamantine lust. fr. toluene, becoming porcelain white @ 100°. — E.s. h. bz.; d.s. alc., eth. — V. stable. — Zn dust ignition gives stilbene. (Vol. I.) — Alc. + Na-amalgam gives tolane, etc.
1710	163	**3,6-Dichlorphthalid, ⌜$C_6H_2Cl_2.CO.O.CH_2$⌝.** — Cryst. fr. alc. — Sbl. — D.s. aq.; s. alc., eth.; s. NaOH.; i. Na_2CO_3.
1715	164; 157–8	**2,6-Dichlorhydroquinone, $Cl_2.C_6H_2.(OH)_2$.** — ⟨G.O.-D.⟩ — Lft. fr. dil. alc.
1720	165–6	**Trichlorbenzoquinone, $C_6HCl_3O_2$.** — Large *yel.* lft.! — I. c. aq.; d.s. c. alc.; e.s. h. alc., eth.; s. w. blue color in conc. H_2SO_4! — In alc. sol. reacts w. aniline to dark brown color. — m-Nitraniline deriv.: $\bar{C} + 2C_6H_4.(NO_2)(NH_2)$, black-green pr. w. met. lust., red by transm. light; m.p. 108° (Ann. **228**, 325).
1725	abt. 165 d.	**Dichlorphenanthrone, ⌜$CCl_2.C_6H_4.C_6H_4.CO$⌝.** — ⟨G.O.-E.⟩ — Pr. fr. chlf. or bz. — E.s. chlf., bz.; less . eth.; d.s. c. alc. — Alc.-KOH gives at first phenanthrenequinone.
1730	166	**2,3-Dichlorbenzoic Ac., $Cl_2.C_2H_3.CO_2H$.** — ⟨T. **4**.3b⟩.
1735	166; 169–70; 172	**2,5-Dichlorhydroquinone, $Cl_2.C_6H_2.(OH)_2$.** — ⟨G.O.-D.⟩ — Long ndl. fr. h. aq. — Sbl. —V.d.s. c. aq., e.s. h.; v.s. alc., eth. —Aniline deriv.: $C_6H_4Cl_2O_2 + 2PhNH_2$: lust. ndl. fr. aq.; m.p. 112–3°. — Diacetate: m.p. 141°.

No.	Melting-point (C.°).	“ ADDITIONAL ELEMENT ” — CHLORINE. — SOLIDS.
1740	abt. 167	**2-Methyl-1,1,1,2-tetrachlorpropane, $\mathbf{Me_2.CCl.CCl_3}$.** — ⟨G.O.-E.⟩ — B.p. abt. 167°. — Odor powerful! — E. vol. w. st. — E.s. alc., eth. — At 180° decd. by aq. to chlorisobutyric ac. (m.p. 79°) & HCl.
1745	169–70; 165–6; 164–5	**3-Chlor-4-hydroxybenzoic Ac., $\mathbf{Cl.C_6H_3.(OH)\ (CO_2H)}$.** — ⟨T. **4**.3b.⟩ — Ndl. — S. in 272 pt. c. aq.; e.s. h. aq.; e.s. alc., eth. — Sbl. — Conc. sol. gives br. ppt. w. $FeCl_3$.
1750	167	**8-Chlor-α-naphthoic Ac., $\mathbf{Cl.C_{10}H_6.CO_2H}$.** — ⟨T. **4**.3b.⟩ — Scales fr. dil. alc. — Sbl. in tbl. — EtĀ: ndl. fr. alc.; m.p. 50°.
1755	168.5	**1,2,3,4,8-(α)-Pentachlornaphthalene, $\mathbf{C_{10}H_3Cl_5}$.** — B.p. a. 360° undecd. — E.s. eth. — W. 8 pt. HNO_3(sp.gr. 1.5) in tube @ 110–20° gives tetrachlornaphthoquinone.
1760	170.5	**oo-Dichlorstilbene Dichloride, $\mathbf{Cl.C_2H_4,CHCl.CHCl.C_6H_4Cl}$.** — ⟨G.O.-E.⟩ — Rhomb. cryst. fr. eth. + lgr. — D.s. abs. alc., lgr.; e.s. eth., chlf. — Alc.-KOH @ 100° gives finally o-dichlortolane.
1765	171–2	**Tetrachlorphenanthrene, $\mathbf{C_{14}H_6Cl_4}$.** — ⟨G.O.-E.⟩ — Sbl. — E.s. eth., bz.; alm. i. alc. — (Not at. by alc.-KOH).
1770	172	**3-Chlor-β-naphthoquinone-(1,2), $\mathbf{C_{10}H_5ClO_2}$.** — *Red.* ndl. fr. chlf.! — S. in h. dil. NaOH; i. Na_2CO_3.
1775	172; 167.5	**5-Chlorsalicylic Ac.-(1), $\mathbf{Cl(HO).C_6H_3.CO_2H}$.** — ⟨T. **4**.3b.⟩ — Sm. ndl. fr. h. aq. — S. in 1100 pt. aq. @ 20°, or in 80 pt. @ 100°; e.s. alc., eth., chlf. — $FeCl_3$ colors aq. sol. violet-red! — $BaĀ_2.3H_2O$: ndl.; v.s. aq., alc. — MeĀ: ndl.; m.p. 48°; s. alc. — Amide: ndl.; m.p. 222–3°; e.s. alc.
1780	172	**5-Chlor-o-toluic Ac., $\mathbf{Cl,Me.C_6H_3.CO_2H}$, ($\mathbf{Me:CO_2H:Cl = 1:2:5}$)** — ⟨T. **4**.3b⟩ — Ndl. fr. aq. — E.s. h. aq. — Amide: lust. ndl. fr. alc.; m.p. 183°.
1785	172	**3,5-Dichlorsalicylic Ald., $\mathbf{Cl_2.C_6H_2(OH)\ (CHO)}$.** — ⟨T. **4**.3⟩ — Silky ndl. fr. alc.
1790	172	**α-o,o-Dichlortolane Dichloride, $\mathbf{Cl.C_6H_4.CCl:CCl.C_6H_4Cl}$.** — B.p. 354°. — Ndl. fr. lgr. — 100 pt. lgr. dis. 0.3546 pt. — Heated w. Zn dust gives oo-dichlortolane.
1795	173–4	**5,8-(p)-Dichlor-α-naphthoquinone, $\mathbf{C_{10}H_4Cl_2O_2}$.** — ⟨G.O.-A.⟩ — Long *yel.* ndl. fr. alc.! — S. eth. — Sbl. in ndl.
1800	174	**Mannitoldichlorhydrine, $\mathbf{C_6H_8Cl_2(OH)_4}$.** — ⟨G.O.-E.⟩ — Monoclin. cryst. — 100 pt. abs. alc. @ 15° dis. 2.4 pt.; @ boiling temp., 15.5 pt. — S. in 22 pt. aq. @ 14°; i. c. eth. — $[\alpha]_D^{14} = -3.75°$ (w. 0.95 g. in 20.5 cc. aq. sol.).
1805	175 d.; d. 170	**Iso- or Allo-Dichlorsuccinic Ac., $\mathbf{CO_2H.CHCl.CHCl.CO_2H}$.** — ⟨T. **4**.3⟩ — Pr. fr. aq. — V. s. aq.; less s. alc.; e.s. eth. — Boiling w. aq. gives chlorfumaric Ac. — $BaĀ.7H_2O$:v.s. aq. — $PbĀ.3H_2O$: cryst.; r.d.s. aq.
1810	176 d. (r.d.)	**d- or l-Chlorsuccinic Ac., $\mathbf{CO_2H.CHCl.CH_2.CO_2H}$.** — ⟨T. **4**.3b.⟩ — Cryst. fr. bz. — 4.5 cc. aq. sol. contains 1 g. — $(\alpha)_D = +20.27°$, (C = 6.66) for d-acid. — (Strong dibasic ac.) — $Ag_2Ā$, ppt.
1812	176	**m-Chlorcinnamic Ac., $\mathbf{Cl.C_6H_4.CH:CH.CO_2H}$.** — ⟨T. **4**.3b.⟩ — Yellowish tbl. fr. aq. — D.s. h. aq.; e.s. h. alc., eth.; less s. bz., lgr.
1815	176	**Chlornaphthazarine, 5,6-Dihydroxy-2-chlornaphthoquinone-(1,4), $\mathbf{(HO)_2,Cl.C_{10}H_3O_2}$.** — ⟨G.O.-A.⟩ — *Black-green* ndl. w. met. lust. fr. gl. ac.ac.! — D.s. alc., eth. — Diacetate: golden ndl. fr. ac. anhydr.; m.p. 192°.
1820	176 d.	**α-Naphthoquinone-β,β-Dichloride, $\mathbf{C_{10}H_6Cl_2O_2}$.** — ⟨G.O.-E.⟩ — Pr. fr. gl. ac.ac. — V.d.s. alc., eth. — (After standing with KOH sol. gives chloroxynaphthoquinone).
1825	177	**Trichlorpyrogallol, $\mathbf{Cl_3C_6(OH)_3}$.** — ⟨G.O.-D.⟩ — Ndl. w. $3H_2O$ of crystn. lost @ 110°. — D.s. c. aq., bz., chlf., CS_2; e.s. alc., eth., h. aq. — Red. ammon. Ag. sol., giving mirror! — Eth. sol. colored blue by $Ba(OH)_2$.
1830	177–8	**Tetrachlorpropane** (fr. $\mathbf{C_3H_8}$ & Cl), **$\mathbf{C_3H_4Cl_4}$.** — ⟨G.O.-E.⟩ — Small ndl. of camphorous odor fr. alc.! — Quickly volat. in air.
1835	178	**5-Chlor-m-toluic Ac., $\mathbf{Cl.C_6H_3.Me,CO_2H,(Me = 1)}$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. dil. alc. — $KMnO_4$ oxidn. gives chiefly 5-chlorisophthalic Ac.
1840	178	**3-Chlorsalicylic-(1) Ac., $\mathbf{Cl(HO).C_6H_3.CO_2H}$.** — ⟨T. **4**.3b.⟩ — Long ndl. fr.

No.	Melting-point (C.°).	“ADDITIONAL ELEMENT” — CHLORINE. — SOLIDS.
		aq. — Vol. w. st. — Sbl. w. sl. dec. — $FeCl_3$ colors aq. sol. intense violet! — 1000 pt. aq. @ 3.5° dis. 0.8 pt. — E.s. alc., chlf. — MeĀ: ndl. fr. alc.; m.p. 83°.
1845	179	**Pentachlorbiphenyl, $C_{12}H_5Cl_5$.** — ⟨G.O.-E.⟩ — B.p. much a. 360°. — Alm. i. alc., eth., bz.; s. gl.ac.ac. — Sbl. in long ndl.
1850	179–80; 178	**1,1,1,2,3-Pentachlorpropane, $ClCH_2.CHCl.CCl_3$.** — ⟨G.O.-E.⟩ — Ndl. fr. h. alc. — Sbl.
1855	181	**7,8-Dichlor-α-naphthoquinone, $C_{10}H_6Cl_2O_2$.** — ⟨G.O.-A.⟩ — Sbl. in long *yel.* ndl. — Mod. s. alc.
1860	182–2.5	**3,5-Dichlorbenzoic Ac., $Cl_2.C_6H_3.CO_2H$.** — ⟨T. 4.3b.⟩ — Ndl. — E.s. aq.
1865	179–81; 184	**3-Chlor-o-phthalic Ac., $Cl.C_6H_3.(CO_2H)_2$.** — ⟨T. 4.3b.⟩ — Ndl. fr. aq. — 100 pt. aq. dis. 2.16 pt. @ 14°. — Ag_2Ā: cryst. fr. h. aq. in sm. ndl. — Distn. of ac. gives anhydride: sbl. in ndl.; m.p. 122;125°.
1870	182	**Naphthalene Tetrachloride, $C_{10}H_8.Cl_4$.** — Large rhombohedra fr. chlf. — D.s. h. alc.; more s. eth. — Heated rapidly to boiling in small quantities gives chiefly 1,4-dichlornaphthalene & HCl. — (Fr. $C_{10}H_8$ & Cl in chlf. sol.)
1875	183	**4,5-Dichlor-o-phthalic Ac., $Cl_2.C_6H_2.(CO_2H)_2$.** — ⟨T. 4.3b.⟩ — Ndl. — S. aq.; e.s. alc., eth., chlf. — Sbl. fr. 130° giving anhydride, m.p. 143°. — Distn. w. Na-lime gives o-dichlorbenzene.
1880	184	**3,4-Dichlor-(β)-naphthoquinone-(1,2), $C_{10}H_4Cl_2O_2$.** — ⟨G.O.-E.⟩ — Lft. fr. gl. ac.ac. — Sbl. undecd. — D.s. alc.; s. chlf.; s. (reacting) in c. dil. NaOH.
1885	185.5	**1,2,4-Trichloranthraquinone, $C_6HCl_3.(CO)_2.C_6H_4$.** — ⟨G.O.-A.⟩ — *Yel.* cryst. fr. chlf. or alc. — D.s. alc.; e.s. chlf., bz.; less s. eth.
1887	185	**α,α′-Dichlor-α,α′-dimethylsuccinic Ac., $CO_2H.(CClMe.)_2.CO_2H$.** — ⟨T. 4.3.⟩ — Crusts fr. aq. — E.s. c. aq., eth.; v.s. alc.; alm. i. c. bz. — Sbl. —
1890	186	**2,3,4,5-Tetrachlorbenzoic Ac., $Cl_4.C_6H.CO_2H$.** — ⟨T. 4.3b.⟩ — Long ndl. fr. alc. — V.d.s. aq.; e.s. alc., eth. — BaĀ$_2$.4 or 3 1/2 Aq.; fine ndl. fr. alc. — EtĀ: m.p. 34.5°.
1895	186–7	**5,8-Dichlor-α-naphthoic Ac., $Cl_2.C_{10}H_5.CO_2H$.** — ⟨T. 4.3b.⟩ — Scales fr. alc. — E.s. alc. — EtĀ: m.p. 61°.
1897	186–8	**2,6-Dichlor-p-toluic Ac., $Cl_2.C_6H_2.Me(CO_2H)$,(Me = 1).** — ⟨T. 4.3b.⟩ — Lft. fr. alc. — BaĀ$_2.4H_2O$: ndl.; v.d.s. h. aq.
1898	187	**2,5-Dichlor-p-toluic Ac., $Cl_2.C_6H_2.Me(CO_2H)$,(Me = 1).** — ⟨T. 4.3b.⟩ — Broad ndl. fr. alc. — E.s. alc. — BaĀ$_2.4H_2O$: ndl.; e.s. aq.
1900	187	**Dichloranthracene (α)-Tetrachloride, $C_{14}H_8Cl_2.Cl_4$.** — ⟨G.O.-E.⟩ — **(Fr. anthracene & Cl).** — Ndl. fr. bz. + alc. — Evolves HCl in fusion. — D.s. alc.; e.s. bz., eth. — Alc.-KOH gives HCl & α-tetrachloranthracene.
1905	187–8 (s.t.)	**Hexachlorethane, Perchlorethane, $CCl_3.CCl_3$.** — B.p. 185°c.! — Sp.gr. = 2.011. — Tbl. of camphorous odor fr. alc. + eth. — Alc.-KOH in tube at 100° gives oxalic ac., C_2H_4 & H.
1910	186–7; 190–1	**Pentachlorphenol, $Cl_5.C_6H.OH$.** — ⟨G.O.-D.⟩ — **B.p. 309–10° d. (754 mm.)** — Sp.gr. = 1.978 @ 22° — Sbl. in long ndl. — Monoclin. cryst. fr. bz. — Odor *when hot* v. pungent. Dust provokes violent sneezing. — V.s. alc., eth.; mod.s. bz.; d.s. c. lgr.; s. dil. h. Na_2CO_3 sol. & reppt'd. by HCl. — C. fuming HNO_3 gives chloranil. — Warmed w. conc. HNO_3 gives chlorpicrin & chloranil! — BaĀ$.2H_2O$: ndl.; d.s. c. aq. — Acetate (fr. ac. anhydr. & sod. ac.): m.p. 147–8°; e.s. warm alc.
1915	188–9	**Dichlorfluorenone, $(C_6H_3Cl).CO$.** — Dist. undecd.
1920	189	**1,5-Bis-trichlormethyltetroxan, $\ulcorner CH(CCl_3).O.CH_2.O.CH(CCl_3).O.CH_2.O \urcorner$.** — Clear refractive pr. — Above m.p. volat. w. sl. decn. & formation of formic ald. — I. aq.; d.s. h. alc.; more s. h. bz. — (Fr. formic ald., chloral hydrate & sulph. ac.).
1925	190	**Mellitic Ac. Chloride, $C_6.(COCl)_6$.** — ⟨T. 4.11⟩ — Glassy cryst. fr. eth. or bz. — Sbl. @ 240° in lft. — E.s. eth. — Boiling w. aq. dec. slowly to HCl & mellitic ac. (Cf. Vol. I.)
1930	190,	**Mairogallol, $C_{18}H_7O_{10}Cl_{11}$. — (Fr. Cl & pyrogallol). — Orthorhomb. pr. —**

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
	(browning)	I. aq.; e.s. h. alc.; v.s. eth.; i. CS_2, lgr. — (Decd. by long boiling w. aq.) — Zn dust + aq. red. to trichlorpyrogallol.
1935	191	**(α)-Tetrachloranthraquinone, $Cl_4.C_6.(CO)_2.C_6H_4$.** — ⟨G.O.-A.⟩ — *Golden* ndl.! — Does not sbl. — Alm.i. alc., eth.; e.s. chlf., bz.; d.s. gl. ac. ac. — Ignition w. Zn dust gives anthracene easily.
1940	191c (s.h.); abt. 160–180 (r.h.)	**3,6-Dichlor-o-phthalic Ac., $Cl_2.C_6H_2.C_2O_3$.** — ⟨T. **4**.3b.⟩ — Tbl. — S. h. aq.; e.s. alc., eth. — (M.p. given is that of the anhydride wh. is rapidly formed at 130–40°; m.p. (r.h.) is abt. 183–5°). — $Et_2\bar{A}$: (fr. Ag salt & EtI) cryst. fr. 50% alc.; m.p. 60°.
1942	191; 191–2 c.	**Chlorfumaric Ac., $CO_2H.CH:CCl.CO_2H$.** — ⟨T. **4**.3⟩ — Tbl. fr. gl. ac. ac. — Sbl. — V.s. aq., alc., eth.; alm. i. bz., lgr. — Slowly boiled dec. largely to CO,CO_2 & HCl. — (Dil. aq-KOH splits off HCl).
1945	191–3	**α-Stilbene Chloride, Ph.CHCl.CHCl.Ph.** — ⟨G.O.-E.⟩ — Ndl. fr. alc. — Sbl. in lft. — Repeatedly heated @ 200° m.p. drops to 160 ; but on recrystn. the α-chloride of m.p. 192° again separates. — D.s. h. alc.; e.s. h. toluene. — Alc.-KOH gives tolane & HCl easily.
1950	189; 196	**2,3-Dichlornaphthoquinone-(1,4), $C_{10}H_4Cl_2O_2$.** — ⟨G.O.-A.⟩ — *Gold-yel.* ndl.! — I. aq.; d.s. c. alc., eth.; e.s. h. alc. E.s. boiling NaOH sol. w. carmine-red color! — Long boiling w. HNO_3 (sp.gr. 1.35) gives phthalic ac. — Warmed w. aniline & alc. gives chloranilinenaphthoquinone (long copper-red ndl.; m.p. 202°; i. aq.; s. alk. w. deep violet, or in conc. H_2SO_4 w. magenta-red color).
1952	193	**3-Chlor-β-naphthoic Ac., $Cl.C_{10}H_6.CO_2H$.** — ⟨T. **4**.3b.⟩ — Lust. ndl. fr. aq. — Chloride: m.p. 216°.
1953	196	**1-Chlor-β-naphthoic Ac., $Cl.C_{10}H_6.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. bz. — Vol. without decn. — Na amalgam gives β-naphthoic ac.
1954	192–4	**Dichlormaleic Ac. Dichloride, ClOC.CCl:CCl.COCl.** — S. org. solv. — Vol. w. st. — "Not decd. by boiling aq. or boiling aq.-KOH, but by alc.-KOH."
1955	194	**β-Heptachlornaphthalene, $C_{10}H.Cl_7$.** — Sbl. in small ndl.
1957	194–5	**Tetrachlorpyrocatechol, $Cl_4.C_6H_4.(OH)_2$,(HO:HO = 1:2.)** — ⟨G.O.-D.⟩ — Ndl. fr. h. dil. alc. — D.s. lgr. — Diacetate: thick ndl. fr. gl. ac. ac.; m.p. 190°. — (Fr. Cl. & pyrocatechol in h. gl. ac. ac. sol.
1960	194–6 unc.; 199–201c.	**2-Chlor-p-toluic Ac., $Cl.C_6H_3.Me,CO_2H$, ($Me:CO_2H$ = 1:4).** — ⟨T. **4**.3b.⟩ — Lft. — D.s. h. aq.; e.s. c. alc. — $Ba\bar{A}_2.4H_2O$: ndl.
1965	199	**1^1-Chlor-p-toluic Ac., $CH_2Cl.C_6H_4.CO_2H$.** — ⟨T. **4**.3b.⟩ — Silky ndl. fr. alc. — E.s. h. aq., alc., eth. — Amide: lft. fr. alc.; m.p. 173°; s. in 5 pt. alc.
1970	199–200	**Pentachlorbenzoic Ac., $Cl_5C_6.CO_2H$.** — ⟨T. **4**.3b.⟩ — $Ba\bar{A}_2,4H_2O$, ndl.
1972	200	**o-Chlorcinnamic Ac., $Cl.C_6H_4.CH:CH.CO_2H$.** — ⟨T. **4**.3b.⟩ — Cryst. fr. alc. — Alm. i. h. aq., lgr.; s. alc., eth.
1975	200	**$4,4^1$-Dichlordibenzil, $(C_6H_4Cl.CO)_2$.** — ⟨G.O.-A.⟩ — *Deep yel.* ndl. fr. bz.! — D.s. h. alc., eth.
1980	201–2	**3,4-Dichlorbenzoic Ac., $Cl_2.C_6H_3.CO_2H$.** — ⟨T. **4**.3b.⟩ — Boils undecd. — Fine ndl. fr. h. aq. — Much more s. h. than c. aq. — Vol. w. st. — $Ba\bar{A}_2$. 4Aq.: 100 pt. aq. dis. 1.10 pt. @ 18°. — $Et\bar{A}$: b.p. 262–3°. — Chloride: b.p. 242°. — Amide: ndl.; m.p. 133°.
1985	203	**3,4,5-Trichlorbenzoic Ac., $Cl_3.C_6H_2.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. dil. alc. — Sbl. in long ndl. — Sl. vol. w. st. — Alm. i. c. aq.; e.s. alc., eth., bz. — $Et\bar{A}$: ndl.; m.p. 86°. — Chloride: m.p. 36°. — Amide: ndl. fr. h. bz.; m.p. 176°.
1990	203	**Perchlornaphthalene, $C_{10}Cl_8$.** — B.p. 403°. — S. bz., lgr., chlf.; less s. alc., gl.ac.ac.
1995	204	**2-Chloranthraquinone, $ClC_6H_3.(CO)_2.C_6H_4$.** — Fine ndl. fr. alc. — D.s. c. bz.
2000	204–5	**(en)-Trichlormesitylene, $Me_2.C_6Cl_3$.** — ⟨G.O.-E.⟩ — B.p. 280°. Sbl. — S. h. alc.; e.s. eth. — CrO_3 mixt. does not attack.
2005	205	**(β)-Dichloranthraquinone, $C_{14}H_6Cl_2O_2$.** — ⟨G.O.-A.⟩ — *Yel.* ndl.! — R.d. s. bz.; d.s. alc., eth. — KOH fusion gives alizarine.

No.	Melting-point (C.°).	“ ADDITIONAL ELEMENT ” — CHLORINE. — SOLIDS.
2010	205–7	**Dichloranthracene (β)-Tetrachloride, $C_{14}H_8Cl_2.Cl_4$.** — ⟨G.O.-E.⟩ — Ndl. fr. lgr. + bz. — Decd. by alc.-KOH to HCl & β-tetrachloranthracene.
2015	207	**4-Chlorsalicylic Ac.-(1), $Cl(HO).C_6H_3.CO_2H$.** — ⟨T. **4**.3b.⟩ — Sm. ndl. fr. aq. — Vol. w. st. — Sbl. w. sl. d. — $FeCl_3$ colors aq. sol. violet! — D.s. aq.; e.s. alc., bz., chlf.
2017	208	**2-Chlor-4-hydroxybenzoic Ac., $Cl.C_6H_3.(OH)\ (CO_2H)$.** — ⟨T. **4**.3b.⟩ — E.s. alc., eth., bz.
2020	208–10	**Dichloralizarine, $Cl_2.C_{14}H_4O_2(OH)_2$.** — ⟨G.O.-A.⟩ — *Or.-red* scales fr. alc.! — Sbl. in or.-red cryst.! — E.s. alc., eth., bz. — S. in alk., red! — Gives red-violet ppt. w. lime or baryta sol.
2025	209	**(β)-9,10-Dichloranthracene, $C_{14}H_8Cl_2$.** — ⟨G.O.-A.⟩ — Lust. *yel.* ndl. — E.s. bz.; d.s. alc., eth. — (Unchanged by boiling alk.) — Oxid. agts. give anthraquinone (Vol. I).
2030	210	**4-Chlor-α-naphthoic Ac., $Cl.C_{10}H_6.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. alc. — E.s alc.; d.s. eth., chlf.
2035	210; 212	**2,4,5,6-Tetrachlor-1,3-dimethylbenzene, $Cl_4.C_6Me_2$.** — ⟨G.O.-E.⟩ — Ndl. — Alm. i. c. alc.; e.s. eth., chlf., bz.
2040	213; 214–5	**3-Chlor-4-methoxybenzoic Ac., $Cl.C_6H_3.(OMe)\ (CO_2H)$.** — ⟨T. **4**.3b.⟩ — Lust. scales fr. dil. ac. ac. — Ag. Ā: thin tbl. fr. h. aq.; d.s. h. aq.
2045	214; 219.5	**3,5-Dichlorsalicylic Ac.-(1), $Cl_2(HO).C_6H_2.CO_2H$.** — ⟨T. **4**.3b.⟩ — Cryst. fr. dil. alc. — Sbl. w. sl. d. — V.d.s. h. aq.; e.s. alc., eth. — $FeCl_3$ gives dark red color! — $BaĀ_2.4H_2O$: ndl.; i. c. aq., e.s. h. — MeĀ: ndl.; s. alc.; m.p. 142°. — Amide: ndl.; e.s. alc.; m.p. 209°.
2050	215	**3-Chlor-2-hydroxy-α-naphthoquinone, “Chlornaphthalenic Acid,” $Cl(HO).$-$C_{10}H_4.O_2$.** — ⟨G.O.-A.⟩ — *Yel.* ndl.! — Sbl. undecd. — I. aq.; mod.s. alc., eth., bz. — Oxidn. w. HNO_3 gives phthalic ac. & oxalic ac. — (“Strong ac.”). — Salts yel. or red & v.d.s. c. aq. — KĀ @ 100°: carmine red ndl. — $C_6H_5NH_2.Ā$: cryst.; m.p. 183°; e.s. alk.; split by acids.
2055	215 d.	**(high melting)α,α¹-Dichlorsuccinic Ac., $CO_2H.CHCl.CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — Lust. 6-sided pr. — E.s. alc., eth., chlf.; d.s. bz., lgr. — (C. KOH sol. gives chlorfumaric ac.) — BaĀ: warts; v.s. aq.; i. alc.
2060	215	**3,4,5,6-Tetrachlor-o-xylene, $Me_2.C_6Cl_4$.** — ⟨G.O.-E.⟩ — Sp.gr. = 1.601. — Ndl. — Sbl. — Not vol. w. st. — D.s. c. alc.; e.s. eth., bz. — (Not at. by conc. HNO_3 @ 200°).
2065	218	**Pentachlortoluene, $C_7H_3Cl_5$.** — ⟨G.O.-E.⟩ — B.p. 301°. — Hairlike ndl. fr. bz. — V.d.s. h. alc. or eth.; mod.s. h. bz.; d.s. c. CS_2.
2070	218	**Tetrachlor-p-xylene, $Me_2.C_6Cl_4$.** — ⟨G.O.-E.⟩ — Silky ndl. fr. gl.ac.ac. — E.s. eth., bz., h. alc.
2075	220; 164	**(α)-Tetrachloranthracene, $C_{14}H_6Cl_4$.** — ⟨G.O.-E.⟩ — *Gold-yel.* ndl.! — D.s. alc., s. h. bz. — Oxid. by HNO_3 to dichloranthraquinone.
2080	d. 220	**5,6-Dihydroxy-1,4-naphthoquinone or Naphthazarine Dichloride, $Cl(HO)_2.$-$C_{10}H_4O_2$.** — ⟨G.O.-E.⟩ — *Dark yel.* pr. fr. chlf.! — Mod.s. chlf.; d.s. eth. — Boiling w. alc. gives chlornaphthazarine, m.p. 176°.
2082	223	**2,4,6-Trichlorisophthalic Ac., $Cl_3.C_6H.(CO_2H)_2$.** — ⟨T. **4**.3b.⟩ — S.h. aq.; e.s. alc., eth., chlf. — $BaĀ.5H_2O$: lft.
2085	abt. 226 d.	**Benzoquinone Tetrachloride, ⌜CHCl.CHCl.CO.CHCl.CHCl.CO⌝.** — Flat ndl. fr. gl.ac.ac. — I. c. alc. — Zn dust + ac.ac. gives hydroquinone.
2090	226; 227	**Perchlorbenzene, C_6Cl_6.** — ⟨G.O.-E.⟩ — B.p. 326°. Sp.gr. = 1.5191 (266°). — Long thin pr. fr. mix. bz. + alc. — I. c. alc.; v.d.s. h. alc.; more s. h. bz.; d.s. eth. — At 16.5° 20 cc. CS_2 dis. 0.4045 g. — (Formed in many reactions).
2095	232 (browning)	**3,4,6-Trichlortoluquinone-(2,5), $Me.C_6Cl_3O_2$.** — ⟨G.O.-A.⟩ — *Yel.* lft.! — Vol. w. st. — D.s. c., e.s. h. alc.; e.s. h. eth.; alm. i. aq. — W. conc. KOH & some alc. gives a red methylchlorquinonic ac.
2100	232	**1,5-Dichloranthraquinone, $ClC_6H_3.(CO)_2.C_6H_3Cl$.** — ⟨G.O.-A.⟩ — *Yel.* cryst. fr. toluene! — R.d.s. alc.; e.s. nitrobenzene. — S. in conc. H_2SO_4, red-yel. — (D.R.P. 131538).

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
2105	232	**Tetrachlorhydroquinone, $Cl_4.C_6(OH)_2$.** — ⟨G.O.-D.⟩ — Lust. monoclin. cryst. fr. bz. — I. aq.; alm. i. CS_2, bz.; e.s. alc., eth.; d.s. gl.ac.ac.; e.s. alk., sol., browning in air. — Red. Ag. sol. — Oxid. agts. give chloranil. — Diacetate: d.s. c. alc.; m.p. 245°.
2110	236; 243	**p-Chlorbenzoic Ac., $Cl.C_6H_4.CO_2H$.** — ⟨T. **4**.3b.⟩ — Tbl. & pr. fr. alc. + eth. — S. in 5288 pt. aq.; e.s. alc., eth. — $Me\bar{A}$: ndl.; m.p. 42°, 43°. — Amide: ndl. fr. eth.; m.p. 170°; d.s. c. aq.; e.s. alc., eth. — Anilide: ndl. fr. alc.; m.p. 194°. — Chloride: b.p. 220–22°.
2112	240–2	**p-Chlorcinnamic Ac., $Cl.C_6H_4.CH:CH.CO_2H$.** — ⟨T. **4**.3b.⟩ — Cryst. — D.s. c. aq., eth., bz.; e.s. alc.
2115	244	**Tetrachlornaphthazarine, 2,3,7,8-Tetrachlor-5,6-dihydroxynaphthoquinone-(1,4), $Cl_4(HO)_2.C_{10}O_2$.** — ⟨G.O.-D.⟩ — *Dark red* tbl. w. met. reflectn. fr. gl.ac.ac.! — D.s. alc., chlf., eth. — The salts are deep blue!
2120	245	**5-Chlor-α-naphthoic Ac., $Cl.C_{10}H_6.CO_2H$.** — ⟨T. **4**.3b.⟩ — Lust. ndl. — Sbl. in ndl. even before melting. — E.s., alc.; d.s. bz. — Amide: cryst.; v.d.s. warm alc.; m.p. 239°. — $Et\bar{A}$: m.p. 42°; tbl. fr. alc.
2130	249–50	**Hexachlorphenanthrene, $C_{14}H_4Cl_6$.** — Sbl. in feathery ndl. — V.d.s. alc., eth.; more s. h. gl.ac.ac.
2135	250	**Trichlor-α-naphthoquinone, $C_{10}H_3Cl_3O_2$.** — ⟨G.O.-A.⟩ — Long *yel.* ndl.! — Sbl. in ndl. — E.s. h. alc. — S. alc. — NaOH dis. w. intense red color!
2140	250	**Tetrachlorphthalic Ac., $C_6Cl_4.(CO_2H)_2$.** — ⟨T. **4**.3b.⟩ — (Forms anhydride, m.p. 252°, in melting). — Thick tbl. fr. slow cooling aq. sol. — 100 pt. aq. @ 14° dis. 0.57 pt., or 3.03 pt. @ 99°. — E.s. alc., eth.; d.s. chlf., bz. — Stable to oxid. agts. (Alc.-KOH @ 200° gives trichloroxyphthalic ac.). — $Ba\bar{A}.2\frac{1}{2}H_2O$: cryst. powd.; alm. i. aq. — $Ag_2\bar{A}$: ppt. of mic. ndl.; e.s. aq. — $Me_2\bar{A}$: pr.; m.p. 92°. — $Et_2\bar{A}$: pr.; m.p. 60°.
2145	252 c.	**Tetrachlorphthalic Anhyd., $C_8Cl_4O_3$.** — ⟨G.O.-E.⟩ — (D.R.P., 50177) — Sbl. in pr. or ndl. — I. c. aq.; d.s. eth. — Changed by alk. to corresp. ac. (of m.p. 250°), & slowly by boiling aq.
2150	252	**Fluoresceine Chloride, $\ulcorner C_6H_4.C[(C_6H_3Cl)O].CO.O \urcorner$.** — Sm. pr. — D.s. alc., eth.; e.s. h. toluene, chlf. — $Ca(OH)_2$ & aq. @ 230° gives fluoresceine & HCl. (Pat.).
2155	255	**1,2-Dichloranthracene, $C_6H_2Cl_2.C_2H_2.C_6H_4$.** — Fine ndl. — S. h. alc.; less s. chlf.; e.s. gl.ac.ac. — CrO_3 oxid. to α-dichloranthraquinone.
2160	256–7	**Trichlorpyrene, $Cl_3C_{16}H_7$.** — Felted ndl. — E.s. h. xylene; s. CS_2, bz.; v.d.s. alc.; d.s. eth., lgr.
2165	257–8.5; 255–6; 265	**3,5-Dichlor-4-hydroxybenzoic Ac., $Cl_2.C_6H_2.(OH)(CO_2H)$.** — ⟨T. **4**.3b.⟩ — Ndl. — Sbl. @ 250–60°. — D.s. c. aq.; e.s. alc., eth. — $FeCl_3$ gives br. ppt. in conc. sol. — $Me\bar{A}$: ndl.; e.s. alc.; m.p. 121–2°.
2170	abt. 260	**β-Chlorbenzene Hexachloride, $C_6H_5Cl_7$.** — ⟨G.O.-E.⟩ — Sbl. — Alm. i. eth. — Alc.-KOH gives 1,2,3,5-tetrachlorbenzene.
2175	265–7	**x-Chloralizarine, $Cl(HO)_2.C_{14}H_5O_2$.** — ⟨G.O.-E.⟩ — *Yel.-red* ndl. fr. toluene! — D.s. h. aq. — (D.R.P., 771179).
2180	267	**Dichlorchrysene, $C_{18}H_{10}Cl_2$.** — ⟨G.O.-E.⟩ — Ndl. fr. bz. — Sbl. in ndl. — Alm. i. h. alc., CS_2, eth. — (Alc.-KOH at. only on heating in s.t.).
2181	267–9	**Tetrachlorisophthalic Ac., $Cl_4.C_6.(CO_2H)_2$, ($CO_2H:CO_2H$ = 1.3).** — ⟨T. **4**.3b.⟩ — Ndl. — E.s. alc.; alm. i. bz.
2182	269	**$1^1,2^1,3^1,4^1,5^1,6^1$-Hexachlorhexamethylbenzene, $(CH_2Cl)_6.C_6$.** — ⟨G.O.-E.⟩.
2183	270–80	**Octochlorphenanthrene, $C_{14}.H_2Cl_8$.** — Granules. — Sbl. in ndl. — Alm. i. alc., eth.; s. h. gl.ac.ac.; e.s. bz.
2184	278	**5-Chlorisophthalic Ac., $Cl.C_6H_3(CO_2H)_2$.** — ⟨T. **4**.3b.⟩ — Long fine ndl. fr. aq. — E.s. aq., alc. — $Ba\bar{A}.2H_2O$: (dried over H_2SO_4) fine ndl.; s. in 71 pt. aq. @ 15°. — Dimethyl ester: pr. fr. alc.; m.p. 45°.
2185	280	**4,6-Dichlorisophthalic Ac., $Cl_2.C_6H_2.(CO_2H)_2$, ($CO_2H:CO_2H$ = 1:3).** — ⟨T. **4**.3b.⟩ — Ndl. — E.s. alc., eth., chlf. — $Ba\bar{A} + H_2O$: lft.; e.s. h. aq.
2186	279–81	**2,3,5,6-Tetrachlorterephthalic Ac., $Cl_4.C_6.(CO_2H)_2$.** — ⟨T. **4**.3b.⟩ — Pr. fr. h. aq. — Alm. i. bz.

No.	Melting-point (C.°).	" ADDITIONAL ELEMENT " — CHLORINE. — SOLIDS.
2187	283–4(s.t.)	**Chloranilic Ac., 3,6-Dichlor-2,5-dioxybenzoquinone, $Cl_2(OH)_2C_6O_2$.** — ⟨G.O.-A.⟩ — *Red* lust. lft.! — Cryst. w. $2H_2O$ (lost @ 115°). — (Strong dibasic ac.) — 100 pt. aq. dis. 0.19 pt. @ 13.5°, or 1.4 pt. @ 99°. — Aq. sol. red, but decolorized by HCl or H_2SO_4. — Warmed w. HNO_3 (sp.gr. 1.45)/ gives chlorpicrin & oxalic ac. — $Na_2\bar{A}.4H_2O$: carmine red ndl.; s. in 100 pt. c. aq.; intense violet sol. —$Ag\bar{A}$: red ppt. — $Me_2\bar{A}$: garnet red pr. fr. bz.; m.p. 141–2°. (Fr. $Ag\bar{A}$ & MeI).
2190	290 (s.t.)	**Tetrachlorbenzoquinone, Chloranil, $C_6Cl_4O_2$.** — ⟨G.O.-A.⟩ — Sbl. in open tube without melting undecd. — *Gold-yel.* lft.! — Monoclin. pr. fr. bz. — I. aq.; d.s. h. alc.; s. eth. — Warm a cryst. in t.t. w. 1 cc. dimethylaniline. Intense deep violet-blue coloration appears! — *Not* at. by conc. HNO_3 or H_2SO_4. — Colors dil. KOH sol. greenish-black & then purple.
2192	291	**5,8-Dichlor-β-naphthoic Ac., $Cl_2.C_{10}H_5.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. — D.s. alc. — Sbl. — $Ca\bar{A}$. $2\frac{1}{2}$ H_2O: pr. s. in 3018 pt. c. aq. — Amide; ndl. fr. alc.; m.p. 218°.
2193	a.300	**Chlorterephthalic Ac., $Cl.C_6H_3.(CO_2H)_2$.** — ⟨T. **4**.3b.⟩ — D.s. h. aq.; e.s. alc., eth. — $Me_2\bar{A}$: m.p. 60°; e.s. alc., eth.
2194	305–6	**2,5-Dichlorterephthalic Ac., $Cl_2.C_6H_2.(CO_2H)_2$.** — ⟨T. **4**.3b⟩ — Long hairlike ndl. fr. h. aq. — Sbl. — $Ba\bar{A}.4H_2O$: ndl.; v.s. aq. — $Me_2\bar{A}$: pearly lft.; m.p. 136°; 137°.
2195	abt. 310 & sbl.	**cis-Benzene Hexachloride, $C_6H_6Cl_6$.** — ⟨G.O.-E.⟩ — Cryst. s. @ 17.25° in 212.7 pt. bz., or @ 20° in 775 pt. chlf. — (Boiling w. alc.-KOH dec. slowly to HCl & a-$C_6H_3Cl_3$).
2200	320–30 undecd.	**Hexachloranthracene, $C_{14}H_4Cl_6$.** — ⟨G.O.-A.⟩ — Sbl. in long *yel.* ndl. — I. alc., eth., gl.ac.ac., c.bz.; — more s. h. bz., chlf., CS_2. — (Not at. by alc.-KOH or HNO_3.) — Oxdn. by CrO_3 mix. gives tetrachloranthraquinone.
2205	320–30	**Tetrachloranthraquinone, $C_{14}H_4Cl_4O_2$.** — ⟨G.O.-A.⟩ — Sbl. in *yel.* ndl. — E.s. chlf., CS_2, boiling gl.ac.ac. — Not attacked by h. alc.-KOH.
2210	a. 350	**Heptachloranthracene, $C_{14}H_3Cl_7$.** — ⟨G.O.-A.⟩ — Sbl. in sm. *yel.* ndl.! — I. alc., eth., bz., gl.ac.ac.; s. h. chlf. — At. w. dif. by fuming HNO_3.
2215	Not melted @ 350	**Octochloranthracene, $C_{14}H_2Cl_8$.** — Sbl. in feathery cryst. — D.s. CS_2, lgr., nitrobenzene.
2220	a. 360	**Trichlorchrysene, $C_{18}H_9Cl_3$.** — Ndl. fr. bz. — S. in boiling bz. only.

ANALYTICAL TABLES

OF

ORDER III

COMPOUNDS CONTAINING CHLORINE AS "ADDITIONAL ELEMENT."

DIVISION B, LIQUID SPECIES

SECTION 1. WITH SPECIFIC GRAVITY HIGHER THAN 1.15

No.	Boiling-point (C°.).	Specific Gravity	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
2300	8.2 c.	1.392 (18.6/4)	**Phosgene, Carbonyl Chloride, $CO.Cl_2$.** — ⟨T. **4.**11⟩ — Odor powerful, suffocating! — (Toxic). — H. aq. dec. to CO_2 & HCl; c. aq. dec. v. slowly. — Dis. in abs. alc. giving ethyl chloroformate. — Ammonia gives NH_4Cl, urea, & small quantities of guanidine, ammelide & cyanuric ac.
2305	33.5–35; 37	1.250 (15°)	**uns-Dichlorethylene, $CCl_2:CH_2$.** — Soon polymerizes to amorph. mass. — Adds Cl_2.
2310	41.6 c.	1.378 (0°)	**Methylene Chloride, Dichlormethane, CH_2Cl_2.** — Odor sweetish. — Combustible. — S. in 50 pt. aq. — W. NH_3 in MeOH sol. @ 100–125° gives hexamethylenetetramine. (No. **2.**1051.)
2315	55	1.25	**s-Dichlorethylene, Acetylene Dichloride, CHCl:CHCl.** — Mobile liq. — Odor chlf.-like. — Taste sweetish. — Boiling w. alc.-KOH gives chloracetylene. — (Used as solvent & as narcotic "Dioform").
2320	59.9 c.	1.1743 (20/4)	**Ethylidene Chloride, 1,1-Dichlorethane, $CH_3.CHCl_2$.** — Solidifies at − 96.7°. — n_A = 1.405724. — Sapn. w. alc.-KOH gives HCl & chlorethylene. w. yel. sol. & faint aldehyde-resin odor.
2325	61.2 c.	1.52637 (0/4); 1.48069 (25°)	**Chloroform, $CHCl_3$.** — M.p. − 70°. — Odor sweet-ethereal. — Taste sweet. — Not combustible. — S. in 140 pt. aq. @ 17.5°; misc. alc., etc. — Ⓟ Gives powerful carbylamine odor with aniline in T. **2.**12! — Boil 0.1 g. w. 0.3 g. resorcinol, 3 cc. aq. & 3 drops 10% NaOH sol. Sol. becomes yel.-red w. yel.-green fluorescence. (Fr. **27,**668). — Reduces Fehling's sol. on boiling.
2330	69.7 c.	1.827 (16°)	**Chloracetole, 2,2-Dichlorpropane, $Me_2.CCl_2$.** — Alc.-KOH gives $CH_2:CCl,Me$, KCl & allylene.
2335	71.4	1.236 (15°)	**Methyl Chloroformate, $Cl.CO_2.Me$.** — Powerful lachrymator! — E. decd. by aq.
2340	75		**1,2-Dichlorpropene-(1), Allylene Dichloride, CHCl:CCl.Me.**
2345	75	1.206 (15/0)	**1,1-Dichlortrimethylene, $\ulcorner CCl_2.CH_2.CH_2 \urcorner$.** — V. stable. — Unchanged after boiling w. Na. — Br acts slowly.
2350	74.5	1.3249 (26/4)	**1,1,1-Trichlorethane, $CH_3.CCl_3$.** — n_A at 21° = 1.419861. — W. sodium alcoholate at 100° gives $C_2H_2Cl.O.Et$, $C_2H_3(OEt)_3$ & ac.ac.

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
2355	76.5	1.1764 (19.5/0)	**1,1-Dichlorpropene-(1), Cl_2C:CH.Me.** — W. alc.-KOH gives allylene.
2360	76.74 c.	1.6195 (0/4;) 1.595 (20/4)	**Carbon Tetrachloride, Tetrachlormethane, CCl_4.** — Solid at − 22.95°. — Non-combustible. — Odor chlf.-like, sweetish. — S. in 1250 pt. aq.; misc. alc., eth., bz. — Saponifn. w. alc.-KOH gives KCl & K_2CO_3.
2365	83.7	1.2521 (4°)	**Ethylene Chloride, 1,2-Dichlorethane, $CH_2Cl.CH_2Cl$.** — M.p. − 36° (c.). — n_A @ t° = 1.441466–0.000446.t. — Odor & taste chlf.-like. — Does *not* reduce Fehling's sol. — Sapn. w. alc.-KOH gives KCl & vinyl chloride. (No. **3**.3205).
2375	84.4 c.	1.170 (24.5°)	**3,3-Dichlorpropene-(1), Acrolein Chloride, CH_2:CH.$CHCl_2$.** — (Ann. **114**,36).
2380	85		**Chloracetaldehyde, CH_2Cl.CHO.** — Odor v. sharp. — Polymerizes more or less quickly after distn. to solid. — Unites w. ½ H_2O with heat evol. to hydrate: tbl.; e.s. aq.; m.p. 43–50°. — W. alc. gives alcoholate. — Red. h. ammon-$AgNO_3$ sol.
2385	86	1.182 (15/4)	**α-Chlorpropionic Ald., Me.CHCl.CHO.** — Odor pungent. — Alk. $KMnO_4$ oxid. to ac.ac.
2390	88	1.47	**Trichlorethylene, CHCl:CCl_2.** — Heated w. alc.-KOH gives C_2HCl_2.OEt & chloracetylene. — (Solvent for fats & oils, D.R.P. 171900). — Shaken w. alk. $HgCy_2$ sol. gives Hg$(CCl.CCl_2)_2$: lust. plates fr. eth.; m.p. 83°; e.s. eth.
2395	90		**Dichloracetaldehyde, 2,2-Dichlorethanal (1), $CHCl_2$.CHO.** — Vapor strongly attacks eyes! — In contact w. conc. H_2SO_4 gives solid polymer.: cryst., m.p. 129–30°; e.s. h. alc., in traces in h.aq. — W. c. aq. gives hydrate: cryst. fr. bz., m.p. 56°, e.s. aq., eth., b.p. 96–7.5°.
	94 c.	1.135 (20/4)	**Ethyl Chloroformate.** — Lachrymator! — Cf. No. **3**.3372.
2405	94	1.236 (0°) 1.205 (25°)	**2,3-Dichlorpropene-(1), "Epichlorhydrine," CH_2:CCl.CH_2-Cl.** — W. Br_2 gives $C_3H_4Cl_2Br_2$ (b.p. 205°). — Na gives allylene + propylene.
2410	95–7		**2,2-Dichlorbutane, Me.CCl_2.Et.** — W. alc.-KOH gives 2-chlorbutene & ethylacetylene.
2415	96.8 c.	1.66 (14°)	**Propylene Chloride, 1,2-Dichlorpropane, Me.CHCl.CH_2Cl.** — Alc.-KOH gives CHCl:CH.Me & some CH_2:CCl.Me.
2420	97.7 c.	1.506 (25°)	**Trichloracetaldehyde, Chloral, CCl_3.CHO.** — Oily liq. of penetrating odor! — M.p. − 57.5°. — W. aq. soon reacts w. evol. of heat to chloral hydrate. — Liable to slow or sudden polymer. to solid, amorph. metachloral! — Red. ammon. $AgNO_3$ sol. on warming! — Gives odor of phenylcarbylamine w. aniline & alc.-KOH in T. **2**.12.
2425	105–6	1.495 (0°)	**Chloracetyl Chloride, $ClCH_2$.COCl.** — W.aq. gives chloracetic ac.; w. ammonia, chloracetamide.
2430	105	1.315 (20°)	**s-Dichlormethyl Ether, $(CH_2Cl)_2O$.** — Odor suffocating. — Unstable in moist air. Decd. by aq. to HCl & formic ald. — NH_3 gives hexamethylenetetramine, No. **2**.1051.
2435	105–15		**α,α-Dichlorpropionyl Chloride, Me.CCl_2.COCl.**
2440	107–8		**Dichloracetyl Chloride, $CHCl_2$.COCl.** — ⟨T. **4**.11⟩ — Odor pungent. — Fumes in air.
2445	106; 109	1.250 (0°) 1.233 (17.5°)	**1,3-Dichlorpropene, β-Epidichlorhydrine, CHCl:CH.CH_2Cl.** — (Alc.-KOH attacks).
2450	107.5–8.5	1.145 20/0	**1,1-Dichlor-2-methylpropene-(1), Me_2C:CCl_2.**
2455	107–8; 108		**1,2-Dichlor-2-methylpropane, Isobutylene Dichloride, Me_2-CCl.CH_2Cl.** — (W. K_2CO_3 sol. gives α-isobutyleneglycol).
2460	109–10	1.239	**α-Chlorpropionyl Chloride, Me.CHCl.COCl.** — ⟨T. **4**.11⟩ —

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
			(Corresp. esters liq.). — Corresp. acid.: b.p. 185–90°. — Amide (by action of ammon.): lft. fr. dil. alc.; m.p. 117°.
2462	110 sl.d.		**3-Chlor-3-methylpentane, $Me.CClEt_2$.**
2465	113–4 (750)	1.202 (17°)	**3,3-Dichlorbutanone-(2), $Me.CO.CCl_2.Me$.**
2470	114	1.4406 (25.5/0)	**1,1,2-Trichlorethane, $CHCl_2.CH_2Cl$.** — n @ 22° = 1.471928. — Alc.-KOH gives CH_2:CCl_2 & KCl.
2475	114–5	1.359 (20°)	**3,3,3-Trichlorpropene-(1), $CCl_3.CH{:}CH_2$.** — Adds Br_2.
2480	115–6; 110–2	1.195 (14°)	**Chloromethyl Acetate, $Me.CO_2.CH_2Cl$.** — Odor irritating. — Aq. dec. to HCl, ac.ac., & formaldehyde!
2485	115; 116–7	1.387 (14°)	**α-Trichlorpropylene, $Me.CCl{:}CCl_2$** "(?)."
2490	117 c.	1.180 (20°)	**α-Epichlorhydrine, 3-Chlor-1,2-oxidopropane, $\ulcorner O.CH_2.CH(CH_2Cl)\urcorner$.** — Oil. — I. aq. — Taste sweetish-burning. — Odor, like eth. & chlf.
2495	118 c.	1.656 (0/4)	**Trichloracetyl Chloride, $Cl_3C.COCl$.** — W. ammon. gives corresp. amide: m.p. 141°.
2500	117–8; 119	1.158 (13°) 1.162 (16°)	**Chloracetone, $Me.CO.CH_2Cl$.** — Odor after keeping v. irritating. — V.d.s. aq.; misc. alc., eth., chlf. — W. x.s. K_2CO_3 becomes carmine red. — Zn + HCl red. to acetone. — Unites w. $NaHSO_3$ to well crystd. comp., $C_3H_5ClO.NaHSO_3$.
2505	120	1.236 (21°)	**uns-Dichloracetone, $Me.CO.CHCl_2$.** — Pleasant ethereal smelling liq. — D.s. aq. — (KOH gives formic and ac.ac. only.) — Aq. @ 200° gives lactic ac.
2510	119 (740); 125	1.201 (15°)	**1,3-Dichlorpropane, $CH_2Cl.CH_2.CH_2Cl$.** —W. alc.-KOH gives allyl chloride (No. **3**.3255).
2515	121	1.6312 19 (4/4)	**Perchlorethylene, $CCl_2.{:}CCl_2$.** — Combines w. dry Cl_2 in sun to C_2Cl_6; but under aq., trichloracetic ac. is also formed. — (Fat and oil solvent).
2520	122–3		**α,β-Dichlorisobutyric Ald., $Me(CH_2Cl).CCl.CHO$.** — (Fr. chlorination of isobutyl alc.).
2525	124–5	1.2 (20°)	**Crotonyl Chloride, $Me.CH{:}CH.COCl$.** — ⟨T. **4.**11⟩ — Odor suffocating. — W. NaOH sol. & aniline gives anilide, m.p. 115°.
2530	123	1.318 (25°)	**1,2,2-Trichlorpropane, $CH_2Cl.CCl_2.Me$.**
2535	128 c.	1.653 (14°)	**Trichlormethyl Chloroformate, "Diphosgene," $Cl.CO_2.CCl_3$.** — Powerful lachrymator! — Partially decd. to $COCl_2$, No. **3**.2300, on boiling. — Contact w. little $AlCl_3$ dec. e. to CO_2 & CCl_4. — Ammonia reacts violently giving urea & NH_4Cl! — Aniline gives carbanilide & phenylcarbimide.
2540	129; 130 (740)	1.22 (15°)	**Methyl Chloracetate, $ClCH_2.CO_2Me$.** — Gives MeOH on saponif. (Cf. Vol. I, p. 113–114.)
2545	129.5–30; 130–5; 135.1c.	1.5424 (26/0)	**1,1,1,2-Tetrachlorethane, $CCl_3.CH_2Cl$.** — n_A = 1.477156 — 0.000437. t. @ t°. —W. NaOEt gives $C_2HCl_2.O.Et$ & $CH_2(OEt).CO_2Na$.
2550	131.5–2.5	1.173 (20/0)	**1,3-Dichlor-2-methylpropene-(1), $CH_2Cl.CMe{:}CHCl$.**
2555	132 (761)	1.200 (19°)	**Glycol-, or Ethylene-chlorhydrine, β-Chlorethanol-(1), $CH_2Cl.CH_2OH$.** — Misc. aq. — Heating at 100° w. aq. gives glycol & acetaldehyde. — KOH gives ethylene oxide. — CrO_3 mixt. oxid. to chloracetic ac.
2560	132; 140	1.372 (25°) 1.353 (16°)	**1,1,2-Trichlorpropane, $CHCl_2.CHCl.Me$.**
2565	135	1.222 (20/4)	**Ethoxalyl Chloride, $EtO.CO.COCl$.** — ⟨T. **4.**11⟩ — Mobile liq. of suffocating odor. — Fumes in air, changing to oxalic ac. — Sinks in aq. rapidly, disappearing fr. reaction w. aq.
2575	142		**α-Chlorcrotonyl Chloride, $Me.CH{:}CCl.COCl$.** — ⟨T. **4.**11⟩ —

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
			Odor, sharp. — Aq. ammon. gives amide: lft.; m.p. 107°, 112°; d.s. c. aq.
2580	142	1.414 (20°)	**1,2,3-"(β)"-Trichlorpropylene, $CH_2Cl.CCl:CHCl$.**
2585	140–5	1.174 (23°)	**"Dichlorether," $CH_2Cl.CHCl.O.Et$.** — Odor sharp. — (Fr. chlorination of ether).
2590	143–5	1.331 (13°)	**β-Chlorpropionyl Chloride, $CH_2Cl.CH_2.COCl$.** — ⟨T. 4.11⟩.
2595	143	1.381 (19°)	**Methyl Dichloracetate, $CHCl_2.CO_2Me$.** — ⟨G.O.-E.⟩ — (Sapn. gives MeOH.)
2600	144	1.158 (20/4)	**Ethyl Chloracetate, $ClCH_2.CO_2Et$.** — ⟨G.O.-E.⟩ — (Sapn. gives EtOH.)
2605	143–5	heavier than water	**3,4-Dichlorpentene-(2), Me.CHCl.CCl:CH.Me.** — Odor penetrating. — Part. decd. by boiling aq.
2610	145		**2,4-Dichlorbutadiene-(1,4), $CH_2:CCl.CH_2.CCl:CH_2$.** — Dec. in light. — Alc.-KOH gives $Et.O.C_6H_5$.
2615	143–5	1.111 (0°)	**2-Methyl-3,4-dichlorbutane, $Me_2.CH.CHCl.CH_2Cl$.**
2620	145	1.178 (0°)	**β-Chlorethyl Acetate, $Me.CO_2.CH_2.CH_2Cl$.** — KOH gives ethylene oxide & KAc. — I. aq. — (Fr. glycolchlorhydrine & acetic anhydride.)
2625	145–50		**1,1,1-Trichlorpropane, $CCl_3.Et$.** — Heated w. Ag_2O & H_2O gives propionic ac.
2630	146–8	1.362 (15°)	**1,1,3-Trichlorpropane, $CHCl_2.CH_2.CH_2Cl$.** — Alc.-KOH gives allylidene chloride $CH_2:CH.CHCl_2$, a little $CHCl:CH.-CH_2Cl$, & KCl.
2635	147 c.	1.614 (0°); 1.6015 (15/4)	**Acetylene Tetrachloride, s-Tetrachlorethane, $CHCl_2.CHCl_2$.** — M.p. – 36°. — n_A at t° = 1.490509–0.000443. t. — Does *not* reduce Fehling's sol. — With alc.-KOH gives trichlorethylene of b.p. 88°. — In alc. sol. w. Zn gives acetylene. — (Com. solvent for nitrocellulose esters).
2640	146		**Dichlorpentene fr. Hexylchloral, $C_5H_8Cl_2$.** — W. Br_2 gives $C_5H_8Cl_2Br_2$(b.p. 230–40°).
2650	150 (sl.d.)		**5,5-Dichlorhexylene-(1), $Me.CCl_2.CH_2.CH_2.CH:CH_2$.** — H. aq. dec. to HCl & allyl acetone. — Alc.-KOH gives chlorhexine, b.p. 120°.
2655	151 (737)	1.550 (23°)	**2,2,2-Trichlorethanol.** — Odor ethereal. — Red. warm Fehling's sol.! — Cf. m.p. 17.8°.
2660	152	1.489 (19°)	**Methyl Trichloracetate, $Cl_3C.CO_2Me$.** — ⟨G.O.-E.⟩ — Saponif. gives MeOH.
2665	152–3	1.473 (20°)	**1,1,1,2-Tetrachlorpropane, $Me.CCl_2.CHCl_2$.**
2670	153	1.47 (13°)	**1,1,2,2-Tetrachlorpropane, $CHCl_2.CCl_2.Me$.** — Warmed w. alc.-KOH gives $C_3H_3Cl_2$ of b.p. 115° & KCl.
2680	153–4	1.266 (12°)	**Chlormethyl β-Chlorethyl Ether, $CH_2Cl.O.CH_2.CH_2Cl$.** — Aq. dec. to formaldehyde & ethylenechlorhydrine. — C.-$AgNO_3$ removes 1 Cl.
2685	155–7	1.246	**α-Chlor-n-valeryl Chloride, Pr.CHCl.COCl.** — ⟨T. 4.11⟩.
2690	155; 158	1.417 (15°)	**Trichlorhydrine, 1,2,3-Trichlorpropane, $CH_2Cl.CHCl.CH_2Cl$.** — Odor like chloral. — Heated w. 20 pt. aq. at 160° gives glycerine (unlike isomers).
2695	156		**Bis-[trichlor-tert-butyl] Ether, $[Me_2C.(CCl_3)]_2O$.** — Vapors provoke copious flow of tears. — Vol. w. st. — (Boiling alc.-KOH withdraws *part* of Cl).
2700	157.7 (755)	1.282 (20/4)	**Ethyl Dichloracetate, $Cl_2CH.CO_2Et$.** — ⟨G.O.-E.⟩ — Sapn. gives EtOH.
2705	155–60	1.420 (18°)	**Chlormethyl Chloracetate, $CH_2Cl.CO_2.CH_2Cl$.** — ⟨G.O.-E.⟩ — I. aq.; s. org. solv. — Slowly decd. by aq., rapidly by alk., to HCl, chloracetic ac. & formic aldehyde.

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
2710	159.1 c.; 161.7 th.i.	1.6926 (10/4)	**Pentachlorethane, $CCl_3.CHCl_2$.** — n_A at 25.1° = 1.487094. — Alc.-KOH gives C_2Cl_4 & KCl.
2712	160 161–4	1.420 (15)	**Fumaryl Dichloride, COCl.CH:CH.COCl.** — ⟨T.**4**.11⟩ — B.p. 60° (14 mm.).
2720	164	1.496 (17°)	**1,2,2,3-Tetrachlorpropane, $CH_2Cl.CCl_2.CH_2Cl$.** — Alc.-KOH gives C_3H_3Cl & KCl.
2725	164–5 (750)	1.3956 (20/4)	**α,α,β-Trichlorbutyric Ald., $Me.CHCl.CCl_2.CHO$.** — V. hygroscopic, forming hydrate ($1H_2O$): lft. fr. aq., m.p. 74–78°, according to rate of heating.
2730	165		**Tetrachlorpropene, $C_3H_2Cl_4$.**
2735	166	1.352 (11/11)	**s-Dichlormethylal, $CH_2Cl.O.CH_2.OCH_2Cl$.** — S. org. solv. — Decd. by aq. to formic ac. & HCl.
2740	167	1.383 (20/4)	**Ethyl Trichloracetate, $Cl_3C.CO_2Et$.** — ⟨G.O.-E.⟩ Sapn. — gives EtOH.
2745	167–8; 170–5	1.330 (14°)	**α,β,β-Trichlordiethyl Eth., $Me.CHCl.O.CH_2.CHCl_2$.** — I. aq.; misc. alc., eth., bz., chlf. — Decd. by boiling aq. to a mixt.
2750	171–2 (sl.d.)		**β-Chlorisobutyryl Chloride, $CH_2Cl.CHMe.COCl$.** — ⟨T. **4**.11⟩.
2755	170–2		**1,1,1-Trichloracetone, $Me.CO.Cl_3$.** — Unites e. w. aq. to hydrate, $C_3H_3Cl_3O.2H_2O$, (4-sided tbl. which lose aq. on distn.). — Decd. by KOH to ac.ac. & chlf. — Ammon. gives chlf. & acetamide.
2760	172 (767) th.i.	1.307 (0°)	**m-Dichlorbenzene, $C_6H_4Cl_2$.** — ⟨G.O.-E.⟩.
2765	172		**1,3,3-Trichloracetone, $CH_2Cl.CO.CH_2Cl$.** — ⟨G.O.-E.⟩ — (Ammon. gives no chlf., & KOH + aniline gives no phenylcarbylamine).
2770	175	1.351 (17/4)	**1,3-Dichlorpropanol-(2), α-Dichlorhydrine, $CH_2Cl.CH(OH).CH_2Cl$,** — ⟨G.O.-E.⟩ — $n^{16.9}_D$ = 1.480245. — Sol. in 9 pt. aq. @ 19°, or in 6 pt. @ 72°. — Misc. w. eth. — Oxidn. w. CrO_3 mixt. gives dichloracetone or chloracetic ac. — (In technical use as solvent in lacquers).
2772	175–6 (th.i.)	abt. 1.3	**o-Chlorphenol, $Cl.C_6H_4.OH$-** ⟨G.O.-D.⟩ — Odor unpleasant, persistent. — M.p. + 7°.
2775	176	1.215 (15/4)	**2-Methyl-2,3,3-trichlorbutane, $Me_2CCl.CCl_2.Me$.** — ⟨G.O.-E.⟩ — n^{21}_D = 1.472. — Camphor-like crystals.
2785	179 (th.i.)	1.328 (0°) 1.325 (0°)	**o-Dichlorbenzene, $C_6H_4Cl_2$.** — ⟨G.O.-E.⟩ — Still liq. at − 14°.
2790	179–80	1.521 (15°)	**1,1,2,3-Tetrachlorpropane, $CHCl_2.CHCl.CH_2Cl$.** — ⟨G.O.-E.⟩.
2795	180–2; 183	1.482 (17°) 1.624 (15/4)	**1,3,3,3-Tetrachloracetone, $CH_2Cl.CO.CCl_3$.** — ⟨G.O.-E.⟩ — Odor v. irritating! — Warmed w. KOH + aniline gives phenylcarbylamine odor! — Unites w. $4H_2O$ to cryst. hydrate, m.p. 46°. — Red. ammon. $AgNO_3$ in the cold.
2800	180–2 c. (718) alm. undecd.		**1,1,3,3-Tetrachloracetone, $CHCl_2.CO.CHCl_2$.** — ⟨G.O.-E.⟩ — Odor pungent. — E.s. alc., eth., bz. — Unites e. w. aq. to cryst. hydrate: tbl.; m.p. 48–9°. — Unlike unsymet. comp. gives no chlf. w. alkali.
2805	184	1.169 (15°)	**n-Butyl Dichloracetate, $CHCl_2.CO_2.C_4H_7$.** — ⟨G.O.-E.⟩ — Sapn. gives BuOH.
2810	184–5 d.; 209–10	1.702 (15°)	**Perchlorethyl Chloroformate, $Cl.CO_2.C_2Cl_5$.** — ⟨G.O.-E.⟩ — Dec. on boiling to CO_2, C_2Cl_6 etc. — $AlCl_3$ gives CO_2 & C_2Cl_6 (smoothly). — Heating w. aq. gives chiefly C_2Cl_6 & a little $CCl_3.CO_2H$. — Also decd. by alc.
2815	184–6 (sl.d.)		**1,1,2,2,3,3-Hexachlorpropane, $CHCl_2.CCl_2.CHCl_2$.** — ⟨G.O.-E.⟩
2817	184.5–7.5 c. (sl.d.)	1.589 (5/15)	**Chlorfumaryl Dichloride, COCl.CHCCl.COCl.** — ⟨T. **4**.11⟩ — (Fr. tartaric ac. & PCl_5 on water bath).
2820	185–90		**α,α-Dichlorpropionic Ac., $Me.CCl_2.CO_2H$.** — ⟨T. **4**.3⟩ — Sometimes solidif. by cold. — Vol. w. st. — V.s. aq., alc.;

No.	Boiling-point	Specific Gravity	“ADDITIONAL ELEMENT” — CHLORINE. — LIQUIDS.
			i. c. HCl. — NaCl salts out fr. aq. sol. — Boiled w. $Ba(OH)_2$ sol. gives pyruvic ac. — AgĀ: ndl.; d.s. aq., decg. w. violence @ 60° when dry. — Acid chloride: b.p. 105–15°, gives amide w. ammon.; lft.; m.p. 117°; lft. fr. dil. alc. — (Esters liq.).
2825	189.4 c.	1.418 (15°)	**1,2,2,2-Tetrachlorether, $CCl_3CHCl.O.Et$.** — ⟨G.O.-E.⟩ — Distn. w. conc. H_2SO_4 gives EtOH, HCl & chloral.
2830	190–2 c. (sl.d.)	1.4073 (20/20)	**Succinyl Chloride, $COCl.(CH_2)_2.COCl$.** — ⟨T. **4.**11⟩ — Solid @ 0° to cryst., m.p. + 16–17°. — Corresp. amide: ndl. fr. aq.; s. in 220 pt. c., or 9 pt. h. aq., m.p. 242–3°.
2835	192 (753); 186–8 (sl.d.)	1.576 (14°) 1.69 (15°)	**Pentachloracetone, $CHCl_2.CO.Cl_3$.** — ⟨G.O.-E.⟩ — Odor like chloral. — E. vol. w. st. — S. in 10 pt. c. aq., the sat. sol. becoming milky on warming. — W. 1 to 2 vol. aq. @ 0° gives cryst. hydrate: m.p. 15–17°. — Dil. KOH gives chlf. & dichloracetic ac. KOH gives CO_2, HCl & dichloracetic ac. — (Alc. NH_3 gives chlf. & dichloracetamide).
2840	190–5		**Pyrotartaryl Dichloride, $Me.CH(COCl).CH_2.COCl$.** — ⟨G.O.-E.⟩
2845	194; 189–91	1.570 (15/15)	**Dichloracetic Ac., $Cl_2CH.CO_2H$.** — ⟨T. **4.**3 & 10.⟩ — M.p. = – 4°. — RĀ: all liq. — Amide: m.p. 96°, 98°; v.s. w. aq., eth. — p-Toluide: m.p. 153°; scales fr. eth.
2850	194 (745)	1.246 (0°)	**2,4-Dichlor-1-methylbenzene, 2,4-Dimethyltoluene, $Cl_2.C_6H_3.Me$.** — ⟨G.O.-E.⟩ — Oxid. by dil. HNO_3 at 140° to 2,4-dichlorbenzoic ac.
2855	194	1.614 (16°)	**Pentachlorpropane fr. 1,1,2-Trichlorpropane, $C_3H_3Cl_5$.** — ⟨G.O.-E.⟩.
2860	195–6	1.211 (25°)	**3-Chlorcresol-(4), $Cl,Me.C_6H_4.OH$.** — ⟨G.O.-D.⟩ — MeĀ: b.p. 213–15°, liq.
2865	195–7	1.3695 (20/4)	**1,3,4-Tricyclopentane, ⌜$CHCl.CH_2.CHCl.CHCl.CH_2$⌝.** — Not attacked by c. H_2SO_4.
2870	195 (729); 201–2		**3,5-Dichlor-1-methylbenzene.** — ⟨G.O.-E.⟩ — Cf. m.p. 26°.
2875	196.5–7.5 c.		**Diethylmalonyl Chloride, $COCl.CEt_2.COCl$.** — ⟨T. **4.**11⟩. — W. 5 pt. c. conc. aq. ammon. @ 20° gives the diamide: cryst. fr. h. aq.; m.p. 224° c.; s. in 100 pt. c. or in 13.5 pt. h. aq. — Dropped into ammon. gives corresp. amide: lft.; 0.454 pt. s. in 100 pt. boiling aq.; m.p. 110°, 105–6°.
2880	197.2 c.; 198.	1.2187 (15/15)	**Benzoyl Chloride, $C_6H_5.COCl$.** — ⟨T. **4.**11⟩. — M.p. = – 1°. — Odor penetrating & irritating. — Identify by sapn. to benzoic ac. & conv. to benzamide (No. **2.**2051).
2885	197–8	1.317	**β-Chlorethyl Chloracetate, $CH_2Cl.CO_2.CH_2CH_2Cl$.** — ⟨G.O.-E.⟩ — Boiling w. aq. gives chloracetic ac.
2890	197; 204.8	1.265 (15°) 1.281 (0°)	**Trichloracetale, $CCl_3.CH(OEt)_2$.** — ⟨G.O.-E.⟩ — S. in 200 pt. aq.; misc. alc., eth. — Distn. w. conc. H_2SO_4 gives anhydrous chloral.
2895	199–200 (760)		**2,6-Dichlor-1-methylbenzene, $Cl_2.C_6H_3.Me$.** — ⟨G.O.-E.⟩.
2900	195–9; 207–8		**2,3-Dichlortoluene, $Cl_2.C_6H_3.Me$.** — ⟨G.O.-E.⟩ — Oxidn. by $KMnO_4$ gives 2,3-dichlorbenzoic ac., m.p. 166°.
2905	200		**Tetrachlorbutene, $C_4H_4Cl_4$.** — ⟨G.O.-E.⟩.
2910	200		**1,1,2,3,3-Pentachlorpropene-(1), $CCl_2{:}CCl.CHCl_2$.** — ⟨G.O.-E.⟩.
2915	202–4	1.744 (12°)	**Perchloracetone, $(CCl_3)_2.CO$.** — ⟨G. O.-E.⟩ — Freezing mixt. solidif. to tbl., m.p. – 2°. — D.s. aq. — KOH gives KCl, K_2CO_3, chlf., & trichloracetic ac. — W. aq. @ 0° gives hydrate w. 1 H_2O: lft., m.p. + 15°.
2920	201; 207	1.251 (20°)	**3,4-Dichlor-1-methylbenzene, $Cl_2.C_6H_3.Me$.** — ⟨G.O.-E.⟩.

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
2925	204; 212–14 (th. i.)	1.270 (0/4)	**Benzal Chloride, Benzylidene Chloride, $1^1,1^1$-Dichlortoluene, $C_6H_5.CHCl_2$.** — ⟨G.O.-E.⟩ — Odor irritating! — Cl_2 e. replaced. — (Boiling w. K_2CO_3 sol. gives benzaldehyde).
2935	205–7	1.293 (16/17)	**Ethyl α,α-Dichloracetoacetate, $Me.CO.CCl_2.CO_2Et$.** — ⟨G.O.-E.⟩ — Sapn. gives EtOH.
2940	209–10	1.7652 (20/4)	**Hexachlorpropene, $CCl_2:CCl.CCl_3$.** — ⟨G.O.-E.⟩ — Odor raspberrylike. — $n_D^{20} = 1.5091$.
2945	210		**o-Toluyl Chloride, $Me.C_6H_4.COCl$.** — ⟨T. **4**.11⟩ — (Corresp. amide: melts @ 138°; d.s. c. aq. — Corresp. ac.; m.p. 102°.).
2950	210–5	1.579 (16°)	**Pentachlorisobutane, $C_4H_5Cl_5$.** — ⟨G.O.-E.⟩.
2955	213 (sl.d.)	1.338 (0°)	**3-Chlorpropandiol-(1,2), "Monochlorhydrin", $CH_2Cl.CH(OH).CH_2OH$.** — ⟨G.O.-E.⟩ — Misc. aq., alc.; s. eth. — Taste sweet! — Na amalgam red. to propylene glycol. — (Fr. glycerine & HCl).
2960	213–4		**p-Chlorbenzyl Chloride, $Cl.C_6H_4.CH_2Cl$.** — ⟨G.O.-E.⟩ — Cf. m.p. 29°. — Powerful lachrymator.
2965	213–4		**o-Chlorbenzyl Chloride, $Cl.C_6H_4.CH_2Cl$.** — ⟨G.O.-E.⟩ — (C.r. **36**,241).
2970	213–4	1.380 (14°)	**Benzo-Trichloride, $1^1,1^1,1^1$-Trichlortoluene, $C_6H_5.CCl_3$.** — ⟨G.O.-E.⟩ — M.p. – 21.2°c., – 22.5°. — Solidif. temp. – 17°. — Odor irritating. — Warm together 1 drop substance, 1 drop dimethylaniline and 0.1 g. fused $ZnCl_2$. An intense green color quickly appears! — Sap. by refluxing w. aq.-NaOH sol. and isolate the benzoic ac. (T. **1**.312).
2975	213–4	1.29 (8°)	**o-Chlorbenzaldehyde, $C_6H_4Cl.CHO$.** — Ndl. — M.p. – 4.5 to – 3°. — Odor pungent. (Pat. intermediate.)
2980	213–4; 210.5–11.5	1.250 (15°)	**m-Chlorbenzaldehyde, $C_6H_4Cl.CHO$.** — Pr. — M.p. 17–18°, 13°. — (The para isomer also boils at 213–4°).
2985	213	1.446 (26°)	**1,2,4-Trichlorbenzene.** — ⟨G.O.-E.⟩ — Cf. No. **3**.95; m.p. 16°.
2990	213–4		**o-Chlorphenyl Benzoate, $C_6H_4Cl.CO_2.Ph$.** — ⟨G.O.-E.⟩.
2995	214–6 d.	1.574 (24°)	**s-Tetrachloracetic Anhydr., $(CHCl_2.CO)_2O$.** — ⟨G.O.-E.⟩
3000	216–7 c.		**Glutaryl Chloride, $COCl.(CH_2)_2.COCl$.** — ⟨T. **4**.11⟩ — Heavy liq. of irritating odor. — (M.p. of amide, 175°, s in 14 pt. c. aq.).
3005	217		**Isoamyl Trichloracetate, $CCl_3.CO_2C_5H_{11}$.** — ⟨G.O.-E.⟩ — Sap. & identify the alcohol.
3010	220–2	1.377	**p-Chlorbenzoyl Chloride, $Cl.C_6H_4.COCl$.** — ⟨T. **4**.11⟩ — Fumes in air. — Amide melts at 178.3° c.
3015	221		**$1^1,1^1$-Dichlorstyrene, $Ph.CCl:CHCl$.** — ⟨G.O.-E.⟩ — Adds Br to cryst. comp.
3020	221.5		**2,4-Dichlor-1,3-dimethylbenzene, $Cl_2.C_6H_2.Me_2$.** — ⟨G.O.-E.⟩ — Still liq. @ – 20°.
3025	222 c. d.	1.2040 (20/4)	**Diethyl Chlormalonate, $CHCl(CO_2Et)_2$.** — ⟨G.O.-E.⟩ — I aq.; misc. alc., chlf., eth., CS_2. — Warmed w. conc. KOH gives tartronic ac. — X.s. alc.-KOH gives K chloromalonate). — Alc.-NH_3 in cold gives corresp. diamide: cryst. fr. h. aq.; m.p. 170°.
3030	222–4 d.	1.691 (20°)	**s-Hexachloracetic Anhydr., $(CCl_3.CO)_2O$.** — ⟨G.O.-E.⟩.
3035	224–6 (720); 214–6	1.175	**p-Toluyl Chloride, $Me.C_6H_4.COCl$.** — ⟨T. **4**.11⟩ — (Corresp. ac.: m.p. 160.8° c. — Corresp. amide: m.p. 156°.)
3040	225; 220–2	1.268 (0/0)	**$1^2,1^2$-Dichlorstyrene, $Ph.CH:CCl_2$.** — ⟨G.O.-E.⟩ — Cl in CCl_4 sol. gives $Ph.CHCl.CCl_3$.

No.	Boiling-point	Specific Gravity	" ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
3045	227		**4,5-Dichlor-1,2-dimethylbenzene, (liq. modif.), $Cl_2.C_6H_2Me_2$.** — ⟨G.O.-E.⟩ — Solid @ 0°. — M.p. 3°. — (Fr. chlorin. of o-xylene).
3050	228.5; 227-30	1.399 (15°)	**$2,1^1,1^1$-Trichlo toluene, $Cl.C_6H_4.CHCl_2$.** — ⟨G.O.-E.⟩ — Oxidn. by CrO_3 gives o-chlorbenzoic ac. — Aq. @ 170° gives o-salicylic aldehyde.
3055	231-4	1.268 (17/15)	**Diethyl Dichlormalonic Ac., $CCl_2(CO_2Et)_2$.** — ⟨G.O.-E.⟩ — I. aq.; s. alc., eth. — (Alc.-KOH attacks). — Corresp. diamide: tbl.; c.s. h. aq.; m.p. 204°.
3060	232-3 sl. d.		**α,α,β-Trichlorbutyricaldehydediethylacetale, $Me.CHCl.CCl_2.CH(OEt)_2$.** — ⟨G.O.-E.⟩ — Hygroscopic. — I. aq. — odor penetrating.
3065	233-4 d.	1.240 (15/4)	**$1^1,1^2$-Dichlorethylbenzene, $Ph.CHCl.CH_2Cl$.** — ⟨G.O.-E.⟩ — Alc.-KOH gives HCl & ω-chlorstyrene.
3070	234		**$4,1^1,1^1$-Trichlortoluene, $Cl.C_6H_4.CHCl_2$.** — ⟨G.O.-E.⟩ — Oxidn. gives p-chlorbenzoic ac.
3075	235	1.376 (15/4)	**$1^1,1^2,1^2$-Trichlorstyrene, $Ph.CCl{:}C.Cl_2$.** — ⟨G.O.-E.⟩ — n_D = 1.5861. — Adds Br_2 slowly.
3080	235-8; 229-30		**o-Chlorbenzoyl Chloride, $Cl.C_6H_4.COCl$.** — ⟨T. **4**.11⟩ — M.p. − 4°.
3085	235-40		**3,3,4,4,4-Pentachlorpentane, $Me_2CH.CCl_2.CCl_3$.** — Heated w. Ag_2O & aq. gives CO_2 & butyric ac.
3090	241		**Dichlorbenzyl Chloride, $Cl_2.C_6H_3.CH_2Cl$ (?).** — ⟨G.O.-E.⟩.
3095	245 d.	1.79 (25°)	**Pentachlorethyl Trichloracetate, $Cl_3C.CO_2.C_2Cl_5$.** — ⟨G.O.-E.⟩ — Ammonia acts violently giving trichloracetamide.
3100	245		**$4,1^1,1^1,1^1$-Tetrachlortoluene, $Cl.C_6H_4.CCl_3$.** — ⟨G.O.-E.⟩ — Aq. @ 200° gives p-chlorbenzoic ac.
3105	247-50		**$3,1^1,1^1,1^1$-Tetrachlortoluene, $Cl.C_6H_4.CCl_3$.** — ⟨G.O.-E.⟩.
3107	250 (760) (sl. d.)	1.189 (20/20)	**Diethyl Chlorfumarate, $CO_2Et.CH{:}CH.CO_2Et$.** — ⟨G.O.-E.⟩ — Corresp. Acid: m.p. 191°; No. **3**.1942.
3110	255-60		**$1^1,1^1$-Dichlorcymene, p-$CHCl_2.C_6H_4.C_3H_7$.** — ⟨G.O.-E.⟩ — (Fr. cuminol + PCl_5). — W. alc.-KOH gives cuminol.
3115	257	1.518 (22°)	**$1^1,1^1,3,4$-Tetrachlortoluene, $C_6H_3Cl_2.CHCl_2$.** — ⟨G.O.-E.⟩ — (W. aq. @ 220° gives ald. of dichlorbenzoic ac.).
3120	260		**Heptachlorpropane (fr. Propylene Chloride & Cl), C_3HCl_7.** — ⟨G.O.-E.⟩.
3125	263 th.i.	1.1938 (20/4)	**1-(α)-Chlornaphthalene, $C_{10}H_7Cl$.** — ⟨G.O.-E.⟩ — **Picrate:** lemon yel. ndl.; m.p. 137°.
3130	273	1.547 (23°)	**Trichlorbenzyl Chloride, $C_6H_2Cl_3.CH_2Cl$.** — ⟨G.O.-E.⟩.
3135	273	1.536	**$1^1,1^1,3^1,3^1$-Tetrachlorxylene, $(CHCl_2)_2.C_6H_4$.** — ⟨G.O.-E.⟩.
3140	281.5 th.i.; 276	1.4214 (15/15) 1.409 (20/4)	**Phthalyl Chloride, $\ulcorner C_6H_5.CO.O.CCl_2 \urcorner$.** — ⟨T. **4**.11⟩ — Solid @ 0°. — Sapn. by alc.-KOH gives phthalic ac. — (Only v. slowly decd. by aq. or h. Na_2CO_3 sol.
3145	280-1	1.607 (22°)	**$1^1,1^1,2,4,5$-Pentachlortoluene, $Cl_3C_6H_2.CHCl_2$.** — ⟨G.O.-E.⟩ — Solid below 0°. — (Dec. w. aq. @ 250° to trichlorbenzaldehyde).
3150	280-5		**Dichlordiphenylethylene, $(C_6H_4Cl)_2C{:}CH_2$.** — ⟨G.O.-E.⟩ — Dif. oxid. — Unites slowly w. Br.
3155	296	1.634 (25°)	**Tetrachlorbenzyl Chloride, $Cl_4.C_6H.CH_2Cl$.** — ⟨G.O.-E.⟩.
3160	297.5		**α-Naphthoyl Chloride, $C_{10}H_7.COCl$.** — ⟨T. **4**.11⟩ — **Acid: ndl. fr. dil. alc.; m.p. 160°. — Amide: cryst. fr. alc.; m.p. 202°.**

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
3165	305 d.	1.235 (18.5°)	**Diphenyldichlormethane Benzophenone Chloride, $Ph_2.CO.Cl_2$.** — ⟨G.O.-E.⟩ — B.p. 201-2° (35 mm.). — V. reactive. — H. aq. dec. rapidly to HCl & benzophenone.
3170	305-6	1.704 (25°)	**Tetrachlorbenzylidene Chloride, $Cl_4.C_6H.CHCl_2$.** —⟨G.O.-E.⟩ — (Decd. by aq. @ 250° to HCl & ald. of tetrachlorbenzoic ac.).

ANALYTICAL TABLES

OF

ORDER III

COMPOUNDS CONTAINING CHLORINE AS "ADDITIONAL ELEMENT"

DIVISION B, LIQUID SPECIES

SECTION 2. WITH SPECIFIC GRAVITY LOWER THAN 1.15

No.	Boiling-point (C°.)	Specific Gravity	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
3200	–23.7 (760)	0.952 (0°)	**Methyl Chloride, Chlormethane, MeCl.** — M.p. = – 103.6°. — Odor ethereal. — 1 vol. aq. dis. 4 vol. — Combustible gas.
3205	–18 to –15		**Vinyl Chloride, Chlorethene, CHCl:CH$_2$.** — Polymerizes in sunlight to amorph., i. mass of m.p. a. 130° d.
3210	12.5	0.9214 (0°)	**Ethyl Chloride, EtCl.** — M.p. – 142.5°. — V. little s. aq. — Combustible.
3220	23	.931 or .918 (0°)	**2-**(or β-)**Chlorpropene, CH$_2$:CCl.Me.** — Boiling alc.-KOH gives allylene. — Adds conc. HBr in cold, giving Me.C.Cl,-Br,Me (b.p. 94°), distinguishing from α-isomers below.
3225	33.2–33.5 (752)		**1-**(or α-)**Chlorisopropene, ClCH:HCMe.** — Alc.-KOH gives allylene more quickly than its stereoisomer of b.p. 35–6°.
3230	35–6		**1-**(or α-)**Chlorpropene, HCCl:HCMe.** — Alc.-KOH gives allylene, C_3H_4, at 150°. — Adds Br_2 giving $C_3H_5ClBr_2$ of b.p. 177°.
3235	36.5 (th.i.)	0.859 (20°)	**Isopropyl Chloride, 2-Chlorpropane, Me.CHCl.Me.** — ⟨T. **4**.7⟩.
3240	36 (752)		**Ethyl Hypochlorite, ClOEt.** — Yel. liq. — Odor like hypochlorous ac.! — Explodes when vapor is superheated, or in sunlight. — Misc. eth., bz.
3245	44		**Chlortrimethylene, ⌜CHCl.CH$_2$.CH$_2$⌝.** — (Alc.-KOH attacks slowly). — Reacts w. Br.
3250	46.5 (th.i.)	0.891 (17.8°)	**Propyl Chloride, 1-Chlorpropane, Et.CH$_2$Cl.**
3255	46	.955 (0°) .738 (20/4)	**Allyl Chloride, 3-Chlorpropene, CH$_2$:CH.CH$_2$Cl.** — Adds Br_2, giving $C_3H_5ClBr_2$, (b.p. 195°).
3260	51–2 c.	.847 (15°)	**tert-Butyl Chloride, 2-Methyl-2-chlorpropane, Me$_3$CCl.** — Heated w. 6 vol. aq. at 100° gives trimethylcarbinol easily.
3265	51	1.105 (20/4)	**Acetyl Chloride, Me.COCl.** — Odor very sharp. Fumes in air. — Decd. by c. aq. — Ⓓ Convert to acetanilide (No. **2**.1975), or acet-p-toluide (No. **2**.2173).
3270	55		**2-Chlorbutene-(1), CH$_2$:CCl.Et.** — Alc.-KOH gives ethylacetylene.
3275	59.5	1.062 (10°)	**Methyl Chloromethyl Eth., CH$_2$Cl.O.Me.** — Shaking w. aq. gives formaldehyde. — Ammonia gives hexamethylene-

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
			tetramine. — (Irritant to respiratory organs). — (Fr. Cl & MeOH, or HCl w. formic aldehyde & MeOH).
3280	65	.978 (12°)	**2-Methyl-1-chlorpropene, Isocrotyl Chloride, $Me_2C:CHCl$.** — ⟨T. **4.7**⟩ — Yields isobutyric ald. easily in tube w. much aq. at 80–90°.
3285	65	1.045 (5°)	**3-Chlorpropine-(1), $CH:C.CH_2Cl$.**
3290	67 c.	.8707 (20/4)	**2-Chlorbutane, Et.CHCl.Me.** — Odor pleasant, ethereal.
3295	68.5	.8798 (15°) .8836 (15°)	**Isobutyl Chloride, 2-Methyl-1-chlorpropane, $Me_2.CH.-CH_2Cl$.**
3300	71.5–2.5	.933 (20°)	**3-Chlor-2-methylpropene-(1), $CH_2Cl.CMe:CH_2$.** — Warm alk. sol. attacks. — Heated w. aq. gives isobutyric ald.
3305	75	1.14 (0°)	**Acrylyl Chloride, $CH_2:CH.COCl$.** — ⟨T. **4.11**⟩ — Fumes in air. — NH_3 gas in cooled bz. sol. gives amide: lft. fr. bz.; m.p. 84–5°.
3310	72–5; 80	1.023 (15/4)	**Methyl α-Chlorethyl Ether, Me.O.CHCl.Me.** — Fumes in air. — (Fr. HCl, Me.CHO & MeOH).
3315	77	949 (0°)	**1-Chlorbutene-(2), Crotyl Chloride, $Me.CH:CH.CH_2Cl$.** — ⟨T. **4.7**⟩ — Odor pungent.
3320	77.96 c.	.907 (0°) .897 (14°)	**n-Butyl Chloride, 1-Chlorbutane, $Me.(CH_2)_2.CH_2Cl$.**
3325	78	1.065 (20/4)	**Propionyl Chloride, Et.COCl.** — ⟨T. **4.11**⟩ — Odor v. sharp. — Convert to propionanilide, No. **2**.1892; m.p. 104°; or propion-p-toluide, No. **2**.2039, m.p. 124°.
3330	79–80 d; abt. 82		**Chlormethyl Ethyl Ether, $ClCH_2.O.Et$.** — ⟨G.O.-E.⟩ — Decd. by aq. to formaldehyde. — (Fr. formic ald., EtOH & HCl).
3335	85		**Chlorcyclobutane, $^{\ulcorner}CHCl.(CH_2)_2.CH_2{}^{\urcorner}$.** — ⟨T. **4.11**⟩.
3340	85–7	1.143 (10°)	**Propylidene Chloride, 1,1-Dichlorpropane, $CHCl_2.CH_2.Me$.** — W. alc.-KOH gives α-C_3H_5Cl of b.p. 33–5°.
3345	86	.8706 (15/4)	**2-Methyl-2-chlorbutane, $Me_2.CCl.Et$.** — $n_D^{18} = 1.407$.
3350	85–7		**2-Methyl-4-chlorbutylene-(3), $Me_2.CH.CH:CHCl$.**
3355	85–91		**Isoprene Hydrochloride, C_5H_9Cl.**
3360	90	1.053 (15/4)	**α-Chlorisobutyric Ald., $Me_2CCl.CHO$.** — ⟨G.O.-E.⟩ — (Fr. Cl & isobutyl alc.). — Liq. @ – 20°. — Shaken w. 1 vol. conc. H_2SO_4 gives polymer. (Pr. fr. eth. M.p. 107°. Sbl. below 100°.)
3365	91 (753)	.883 (0°)	**2-Methyl-3-chlorbutane, $Me_2CH.CHCl.Me$.**
3370	92	1.017 (20/4)	**Isobutyryl Chloride, $Me_2CH.COCl$.** — ⟨T. **4.11**⟩. Corresp. amide: tbl. fr. bz.; m.p. 128–9°.
3372	94 c.	1.135 (20/4)	**Ethyl Chloroformate (Chlorocarbonate), $Cl.CO_2Et$.** — ⟨G.O.-E.⟩ — A lachrymator! — $AlCl_3$ dec. w. evol. of CO_2 & EtCl. — Decd. by boiling aq. — Mix w. x.s. conc. ammonia (immediate reaction) & evap. to dryness in small glass capsule on water-bath. The residue, urethane (No. **2**.1540) forms colorless cryst., v. s.c. aq., m.p. 49–50°.
3375	94.5	.968 (0°)	**3-Methyl-2-chlorbutene-(2), $Me_2C:CCl.Me$.**
3380	95–7	.872 (5.1°)	**2-Chlorpentene-(1), $Me.(CH_2)_2.CCl:CH_2$.**
3385	97–9	.886 (15°)	**(act.)-Amyl Chloride, 2-Methyl-1-chlorbutane, $CH_2Cl.CH-Me.Et$.**
3390	98		**3-Chlor-2,2-dimethylbutene-(4), $Me_3C.CCl:CH_2$.** — (KOH gives $Me_3.C.C:CH$). — (Fr. pinacolin & PCl_5).
3395	abt. 98d.		**α-Chlordiethyl Eth., "Monochlorether," Me.CHCl.O.Et.** — ⟨G.O.-E.⟩ — Decd. by aq. to HCl, acetaldehyde & ethyl alc. — Dec. on keeping to EtCl & liq., b.p. 75–9°.

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
3400	100.9 c.; 99.6 (758)	.886 (0°)	**Isoamyl Chloride, 2-Methyl-4-chlorbutane, $Me_2CH.CH_2.$-CH_2Cl.** — V. slowly decd. by aq. @ 125°.
3405	100 (sl.d.)		**2-Methyl-2-chlorpentane, $Me_2CCl.C_3H_7$.**
3410	100–1.5	1.028 (20/4)	**n-Butyryl Chloride, $Me.(CH_2)_2.COCl$.** — ⟨T. **4**.11⟩ — (Ann. **161**, 179). — n_D^{20} = 1.41209.
3415	101–3	lighter than aq.	**2-Chloromethylbutene-(1), $CH_2:C(CH_2Cl)Et$.**
3420	103–5	.912 (0°) .891 (21°)	**2-Chlorpentane, $Me.CHCl.(CH_2)_2.Me$.**
3425	103–6 d.		**4-Chlorpentene-(2), Me.CH:CH.CHCl.Me.** — Odor agreeable.
3430	103–5	1.011 (12°)	**2-Methyl-1,1-dichlorpropane, $Me_2.CH.CHCl_2$.** — Heated w. aq. & Ag_2O in tube gives butyric ac.
3435	103–5	.916 (0°)	**3-Chlorpentane, $Et_2.CHCl$.**
3440	105–6		**Trimethylacetyl Chloride, $Me_3C.COCl$.** ⟨T.**4**.11⟩.
3445	107	.901 (0°) .883 (20°)	**n-Amyl Chloride, 1-Chlorpentane, $CH_2Cl.(CH_2)_3.Me$.**
3450	109–14 (sl.d.)		**4-Methyl-4-chlorpentene-(1), $Me_2.CCl.CH_2.CH:CH_2$.**
3455	110 (sl.d.)		**2-Ethyl-2-chlorbutane, Me.CEtCl.Et.**
3457	118	.877 (22°)	**2-Chlor-2,3-dimethylbutane, $Me_2CH.CClMe_2$.** m.p.: – 10.4°; – 9.5°; – 5.8°.
3460	112 (749)	.878 (19°) .897 (0°)	**2,3-Dimethyl-2-chlorbutane, $Me_2.CCl.CHMe_2$.**
3465	112.5–14.5	.899 (0°)	**1,1-Dimethyl-2-chlorbutane, Pinakolinalcohol Chloride, $Me_3C.CHCl.Me$.**
3470	113–15		**1,1-Dichlorbutane, $CHCl_2.Pr$.**
3475	112–14; 114–20	1.126 (0°)	**2,3-Dichlorbutane, Me.CHCl.CHCl.Me.** — (Long boiling w. K_2CO_3 sol. gives methacrylic ac., etc.).
3480	115	.989 (20/4)	**Isovaleryl Chloride, $Me_2.CH.CH_2.COCl$.** — ⟨T. **4**.11⟩.
3485	115–6.5 (752)		**2-Methyl-3-chlorpentane, $Me_2C.CHCl.Et$.**
3490	115; 116	1.032 (0°)	**3-Chlorbutanone-(2), Me.CO.CHCl.Me.**—⟨G.O.-E.⟩—Odor pungent. —(At. by NaOH sol.) — Oxidn. by HNO_3 gives α-chlorpropionic ac.
3495	116–7	1.138 (12°)	**α,α-Dichlorether, $(Me.CHCl)_2O$.** — ⟨G.O.-E.⟩ — Warmed w. aq. dec. to acetaldehyde & HCl.
3500	118–120	.951 (9°)	**Chlorheptene(fr. Isobutyrone & PCl_5),$C_7H_{13}Cl$.** — ⟨T. **4**.7⟩.
3505	120–3 (sl.d.)		**4-Chlorhexene-(1), $Et.CHCl.CH_2.CH:CH_2$.**
3510	122–3 (d.) (747)		**1-Methyl-1-chlorcyclopentane,⌜$MeCCl.(CH_2)_3.CH_2$⌝.** — Dec. to HCl & C_6H_{10} in boiling. — B.p. 97–8° undecd. @ 350 mm.
3515	123–5		**2,3-Dimethyl-1-chlorbutane, $CH_2Cl.CHMe.CHMe_2$.**
3520	125–6; 122.5	.869 (21/4)	**2-Chlorhexane, $Me.CHCl.C_4H_9$.**
3525	126–7		**α-Chlorisobutyryl Chloride, $Me_2CCl.COCl$.** — ⟨T. **4**.11⟩.
3530	125–30		**β-Chlorpropionic Ald., $CH_2Cl.CH_2.CHO$.** — ⟨G.O.-E.⟩ — Red. Fehling's sol. — In presence of HCl polymerizes to solid: m.p. 34.5–5.5°; i. aq.
3535	125–30 d.		**2-Methyl-3-chlorhexene-(5), $Me_2.CH.CHCl.CH_2.CH:CH_2$.**
3540	125–127	1.131 (20°)	**1,1-Dichlor-2-butylene, $CHCl_2.CH:CH.Me$.** — W. alc.-KOH gives C_4H_5Cl, (b.p. 64–5°).
3549	126–7 c.	1.115 (20/20)	**1-Chlorpropanol-(2), $CH_2Cl.CH(OH).Me$.** — ⟨G.O.-E.⟩ —

No.	Boiling-point	Specific Gravity	" ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
			C. aq.-KOH gives propylene oxide. — W. aq. @ 140–60° gives acetone & propionic ald.
3550	127–8	1.015 (15°)	**n-Valeryl Chloride, $Me.(CH_2)_3.COCl$.** — ⟨T. **4.**11⟩.
3555	130–5; 137	1.068 (15/4)	**2-Methyl-2,3-dichlorbutane, $Me_2CCl.CHCl.Me$.** — n_D^{18} = 1.445. — (Heated w. aq. gives methylisopropylketone.)
3560	130	1.05 (24°)	**2-Methyl-4,4-dichlorbutane, $Me_2.CH.CH_2.CHCl_2$.** — KOH gives chloramylene (b.p. 85–7°), & then isopropylacetylene.
3565	132		**Dimethylethylacetyl Chloride, $Me_2EtC.COCl$.** — ⟨T. **4.**11⟩.
3570	132 c.	1.1070 (20/4) 1.1125 (15/15)	**Chlorbenzene, PhCl.** — ⟨G.O.-E.⟩ — M.p. —45°c. — Odor aromatic. — ⟨T. **4.**4a, negative.⟩
3575	133; 126–8	892 (16°)	**n-HexylChloride,1-Chlorhexane,$CH_2Cl.C_5H_{11}$.** —⟨G.O.-E.⟩— Mobile liq. — Odor agreeable. — I. aq.
3580	134–6	1.080 (13°)	**1-Chlor-butanone-(2), $CH_2Cl.CO.Et$.** — ⟨G.O.-E.⟩ — Odor pungent. — I. aq. — Oxidn. w. HNO_3 gives chloracetic ac.
3585	130–40		**5-Chlorhexene-(1), Diallyl Hydrochloride, $CH_2:CH.(CH_2)_2.CHCl.Me$.**
3590	134–7		**Diethylacetyl Chloride, $Et_2CH.COCl$.** — ⟨T. **4.**11⟩.
3592	135; 130–5 (sl.d.)		**2-Chlor-2-methylhexane, $ClCMe_2.(CH_2)_3.Me$.**
3595	135–7		**2-Methyl-5-chlorhexane, $Me_2CH.(CH_2)_2.CHCl.Me$.**
3600	135–8 (757)	.899 (0°)	**3-Methyl-3-chlorhexane, $Et.CMeCl.C_3H_9$.** — Still liq. @ – 15°.
3605	137	1.068 (15/4)	**2-Methyl-2,3-dichlorbutane, $Me_2.CCl.CHCl.Me$.** — n_D^{18} = 1.445.
3610	136–7.5; 138–9	1.105 (20°)	**3-Chlorbutanol-(2), $Me.CHCl.CH(OH).Me$.** — ⟨G.O.-E.⟩ — Rather viscous liq. of pleasant odor. — S. in 20 vol. aq. @ 20°. — n_D = 1.44376. — In tube @ temp. of boiling aniline gives HCl & methylethylketone.
3615	138–9.5		**2,3-Dichlorpentane, $Me.CHCl.CHCl.Et$.**
3620	141–2	.970 (20°)	**Isobutylacetyl Chloride, $Me_2.CH.CH_2.COCl$.** — ⟨T. **4.**11⟩.
3625	140 d.		**Chlorheptene, Heptine Hydrochloride, $C_7H_{13}Cl$.**
3630	141		**Chlorheptene fr. Butyrone & PCl_5, $C_7H_{13}Cl$.**
3635	141	1.056 (0/0)	**3-Chlor-2-methylbutanol-(2), $Me_2C(OH).CHCl.Me$.** — ⟨G.-O.-E⟩ — S. in 15–16 pt. aq. @ room temp. — W. aq. @ 140° gives methylisopropylketone.
3640	143–5	1.111 (0°)	**2-Methyl-3,4-dichlorbutane, $Me_2.CH.CHCl.CH_2Cl$.**
3645	144 d.		**Diallylcarbinol Chloride, $(CH_2:CH.CH_2)_2.CHCl$.** — Odor turpentine-like.
3650	145–6	1 098 (14°)	**Methyl d, l-α-Chlorbutyrate, $Et.CHCl.CO_2Me$.** — ⟨G.O.-E.⟩ — n = 1.42526. — Sapon. gives MeOH.
3655	145–50 (sl.d.)	.890 (0°) .8891 (0°)	**2,4,4-Trimethyl-2-chlorpentane, $Me_3C.CH_2.CClMe_2$.**
3660	146	1.088 (20/4)	**Ethyl α-Chlorpropionate, $Me.CHCl.CO_2Et$.** — ⟨G.O.-E.⟩ — Sapon. gives EtOH.
3665	146		**Isochloracetale, $Me.CHCl.O.CHMe.OEt$.** — ⟨G.O.-E.⟩ — I. aq. — Stable in h. aq.
3670	146	1.145 (15°)	**2,2-Dichlorethanol-(1), $CHCl_2.CH_2OH$.** — ⟨G.O.-E.⟩ — D.s. aq.; s. alc., eth. — Red. ammon. Ag. sol.! — Oxidn. by HNO_3 gives dichloracetic ac.
3675	149	1 094 (15/4)	**Isopropyl Chloracetate, $CH_2Cl.CO_2.C_3H_7$.** — ⟨G.O.-E.⟩ — Sapon. gives isopropyl alc.

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3680	150–5 d.		**2-Methyl-3-ethyl-3-chlorpentane,** $Me_2CH.CEt_2Cl$. — ⟨G.O.-E.⟩
3685	150–5		**6-Methyl-4-chlorheptene-(1),** $Me_2.CH.CH_2.CHCl.CH_2.CH:CH_2$. — ⟨G.O.-E.⟩
3690	151–3		**n-Caproyl Chloride,** $Me.(CH_2)_4.COCl$. — ⟨T. **4.11**⟩ — n = 1.4867. — I. aq. — Corresp. amide: s. h. aq.; m.p. 98–100°.
3695	152–3	1.068 (0°)	**1-Chlor-2-methylbutanol-(2),** $CH_2Cl.CMe(OH)Et$. — ⟨G.O.-E.⟩
3700	152–3 (745)		**Methylisobutylacetyl Chloride,** $(C_4H_9)Me.CH_2.COCl$. — ⟨T. **4.11**⟩.
3705	152–4 (sl.d.)		**2,4-Dichlor-2-methylbutane,** $Me_2CCl.CH_2.CH_2Cl$. — ⟨T. **4.11**⟩.
3710	155		**3-Ethyl-3-chlorhexane,** $Et.CEtCl.C_3H_7$.
3715	155 c.; 148		**Chlorheptene fr. Oenanthylidene Chloride & Alc.-KOH.,-** $C_7H_{13}Cl$.
3720	156.8	1.026 (15°)	**Chloracetale,** $CH_2Cl.CH(OEt)_2$. — ⟨G.O.-E.⟩ — (Cl is reactive). — (Fr. chlorination of alcohol.)
3725	157	1.0807 (20/4)	**o-Chlortoluene, 2-Chlor-1-methylbenzene,** $Me.C_6H_7.Cl$. — ⟨G.O.-E.⟩ — M.p. = – 34°. — Destroyed by CrO_3 mixt. without giving an acid. — (T. **4.**4a, negative.)
3730	159.2 (750)	.881 (16°)	**n-Heptyl Chloride, 1-Chlorheptane,** $CH_2Cl.C_6H_{13}$. — ⟨G.O.-E.⟩
3735	161 (740)	1.110	**Propyl Chloracetate,** $ClCH_2.CO_2Pr$. — ⟨G.O.-E.⟩ — Sapn. gives propyl alc.
3740	161–3		**1,4-Dichlorbutane,** $CH_2Cl.(CH_2)_2.CH_2Cl$. — ⟨G.O.-E.⟩
3745	162.2 (756)	1.0722 (20/4)	**m-Chlortoluene,** $Cl.C_6H_4.Me$. — ⟨G.O.-E.⟩ — M.p. = – 48° — (T. **4.**4a, negative).
3750	162.3 (756)	1.0697 (20/4)	**p-Chlortoluene,** $Cl.C_6H_4.Me$. — ⟨G.O.-E.⟩ — M.p. = +7.4° — Oxidn. by CrO_3 mixt. gives p-chlorbenzoic ac. — (T. **4.**4a, negative.)
3755	162–5	1.053 (11°)	**2,3-Dichlorhexane,** $Me.CHCl.CHCl.C_3H_7$. — Alc. = KOH gives C_6H_{11}.: b.p. 122°.
3760	167–8	.927 (0°)	**1-Chloroctene-(1),** $C_6H_{13}.CH:CHCl$.
3765	165–172		**Ethylisobutylacetyl Chloride,** $(Et)(C_4H_9).CH_2.COCl$. — ⟨T. **4.11**⟩.
3770	168–9 (739)		**Isoamylacetyl Chloride,** $C_5H_{11}.CH_2.COCl$. — ⟨T. **4.11**⟩.
3775	169	1.052 (20/4)	**Ethyl-d,l-β-Chlorbutyrate,** $Me.CHCl.CH_2.CO_2Et$. — ⟨G.O.-E.⟩ — n_D^{20} = 1.4258. — Sapn. gives ethyl alc.
3780	170	1.067 (15/4)	**Isobutyl Chloracetate,** $CH_2Cl.CO_2.C_4H_7$. — ⟨G.O.-E.⟩ — Sapn. gives isobutyl alc.
3785	170–1	1.014 (11°)	**2-Chlor-hexanol-(3),** $Me.CH_2.CH_2.CH(OH).CHCl.Me$. — ⟨G.O.-E.⟩ — Viscous oil. — I. aq.
3790	171–3 c.	.871 (15°)	**2-Chloroctane,** $Me.CHCl.C_6H_{13}$.
3795	172–4	1.085 (15°)	**1,2-Dichlorhexane,** $Me(CH_2)_3.CHCl.CH_2Cl$. — ⟨G.O.-E.⟩
3805	174–5	.959 (20°)	**Oenanthyl Chloride,** $Me(CH_2)_5.COCl$. — ⟨T. **4.11**⟩ — n_D^{15} = 1.43447. — Corresp. amide (by dropping into conc. ammon.): lft.; e.s. aq.; m.p. 95°.
3810	abt. 175	1.0133 (20/0)	**Chlorcycloheptane, Suberyl Chloride,** $\ulcorner CHCl.(CH_2)_6 \urcorner$.
3815	170–80; 175 (764); 179 (760)		**2,5-Dichlorhexane,** $Me.CHCl.(CH_2)_2.CHCl.Me$.
3820	175	1.081 (15°)	**n-Butyl Chloracetate,** $ClCH_2.CO_2C_4H_9$. — ⟨G.O.-E.⟩ — **Sapn. gives n-butyl alc.**

No.	Boiling-point	Specific Gravity	"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.
3825	176–8 (sl.d.)		**1,5-Dichlorpentane, Pentamethylene Chloride, $CH_2Cl.(CH_2)_3.CH_2Cl$.** — ⟨G.O.-E.⟩ — I. aq.; s. org. solv. — Odor like ethylidene chloride & amyl alc.
3830	179 (760); 179 (th.i.); 175 (760)	1.1040 (15/15)	**Benzyl Chloride, 1^1-Chlortoluene, $C_6H_5.CH_2Cl$.** — ⟨G.O.-E.⟩ — M.p. = – 43 to 48°. — Vapors v. irritating to eyes. (Long boiling w. 30 pt. aq gives HCl & Benzyl alc.) — Oxidize to benzoic ac. by T. **1**.905. — T. **4**.7a easily gives large yield of benzyl 3,5-dinitrobenzoate: long silky ndl. fr. h. alc.; m.p. 113° u.c.!
3835	181		**4,4-Dichlorheptane, $(Me.CH_2.CH_2)_2.CCl_2$.**
3840	182.5–3.5 c.; 179.5–80.5; 183.6–184.6 (th.i.)	.879 (15°) .880 (16°) .884 (8.4°)	**n-Octyl Chloride, 1-Chloroctane, $CH_2Cl.(CH_2)_6.Me$.**
3845	183–4	1.138 (14°)	**Dichloracetale, $CHCl_2.CH(OEt)_2$.** — ⟨G.O.-E.⟩ — (Fr. chlorination of alc.) — Warmed w. conc. H_2SO_4 gives dichloracetaldehyde.
3850	185.5 (th.i.)	.934 (20°)	**Chlornononaphthylene, $C_9H_{17}Cl$.**
3855	184 c.	1.111 (16.5)	**Ethyl α-Chlorisocrotonate, $Me.CCl:CH.CO_2Et$.** — ⟨G.O.-E.⟩ — Sapn. gives EtOH.
3860	186	1.28 (0°)	**d,l-α-Chlorpropionnic Ac., $Me.CHCl.CO_2H$.** — ⟨T. **4**.3⟩ — Misc. aq. — $R\bar{A}$: all liq. — Amide: scales; e.s. aq.; m.p. 80°. — (Fr. chloride & ammon., Ber. **9**,1592.)
3863	180–90 (720 mm.)	0.887 (20°)	**1-Chlordecane, $CH_2Cl.(CH_2)_8.Me$.** — ⟨G.O.-E.⟩ — Warmed w. $Ba(OH)_2$ aq. gives nonyl alc.
3865	187	1.06 (20°)	**4-Chlor-1,3-dimethylbenzene, $Cl.C_6H_3.Me_2$.** — ⟨G.O.-E.⟩ — (T. **4**.4a, negative.)
3870	189.5 c.		**3-Chlor-1,2-dimethylbenzene, $Cl.C_6H_3Me_2$.** — ⟨G O.-E.⟩ — (T. **4**.4a, negative.) — liq. @ – 20°. — (Fr. chlorination of o-xylene) — Oxidn. w. dil. HNO_3 gives 6-chlor-o-toluic ac.
3875	190 (751.5)	1.063 (0°)	**Isoamyl Chloracetate, $Cl.CH_2.CO_2C_5H_{11}$.** — ⟨G.O.-E.⟩ — Sapn. gives $C_5H_{11}OH$.
3877	190	0.856 (20°)	**2-Chlornonane, $Me.(CH_2)_6.CHCl.Me$.** — ⟨G.O.-E.⟩ — Odor, faint.
3880	190–1 (755)		**5-Chlor-1,3-dimethylbenzene, $Cl.C_6H_3Me_2$.** — ⟨G.O.-E.⟩ — (T. **4**.4a, negative.)
3885	191 c.		**1,1-Dichlorheptane, $CHCl_2.C_6H_{13}$.** — ⟨G.O.-E.⟩ — B.p. 82–4° (30 mm.) — Odor oenanthol-like. — Alc.-KOH yields $C_7H_{13}Cl$ & finally C_7H_{12}, b.p. 100°.
3890	191. 5c.	1.069 (15°)	**4-Chlor-1,2-dimethylbenzene, $Cl.C_6H_3Me_2$.** — ⟨G.O.-E.⟩ — St. liq. @ – 20°. — Boiling w. dil. HNO_3 gives two chlor-o-toluic acids. — (By chlorination of o-xylene). — (T. **4**.4a, negative.)
3895	193		**m-Chlorphenyl Methyl Ether, m-Chloranisole, $Cl.C_6H_4.OMe$.** — ⟨G.O.-E.⟩ — Yellowish oil. — Vol. w. st.
3900	193 (sl.d.)	1.19 (14/17)	**Ethyl α-Chloracetoacetate, $Me.CO.CHCl.CO_2Et$.** — ⟨G.O.-E.⟩ — D.s. aq.; e.s. alc., eth. — $FeCl_3$ gives intense violet color! — Sapn. gives EtOH.
3905	194 (sl.d.)		**1^1-(α)-Chlorethylbenzene, Ph.CHCl.Me.** — ⟨G.O.-E.⟩
3910	194–6	.973 (8°)	**Caprylyl Chloride, $Me.(CH_2)_6.COCl$.** — ⟨T. **4**.11.⟩
3915	195–6	1.064 (20°)	**1^1-Chlor-1,3-dimethylbenzene, $CH_2Cl.C_6H_4.Me$.** — ⟨G.O.-E.⟩
3920	190–200		**2,2-Dichloroctane, $Me.CCl_2.C_6H_{13}$.** — ⟨G.O.-E.⟩
3925	195–6		**o-Chlorphenyl Methyl Ether, o-Chloranisole, $Cl.C_6H_4OMe$.** — ⟨G.O.-E.⟩
3930	192; 200–2		**1^1-Chlor-1,4-dimethylbenzene, $CH_2Cl.C_6H_4.Me$.** — ⟨G.O.-E.⟩ — Vapors attack the eyes!

No.	Boiling-point	Specific Gravity	**"ADDITIONAL ELEMENT" — CHLORINE. — LIQUIDS.**
3935	196; 180–4	.899 (16°) .911 (23°)	**Nonyl Chloride, Chlornonane (fr. Petroleum), $C_9H_{19}Cl$.** — ⟨G.O.-E.⟩
3940	197.7 (759)		**p-Chlorphenyl Methyl Ether, p-Chloranisole, $Cl.C_6H_4OMe$.** — ⟨G.O.-E.⟩ — Does *not* solidify @ – 18°.
3945	197–9		**1^1-Chlorxylene, o-Xylyl Chloride, $Me.C_6H_4.CH_2Cl$.** — ⟨G.O.-E.⟩ — (Fr. chlorination of o-xylene.)
3950	199		**1^1-Chlorstyrene, $C_6H_5.CCl{:}CH_2$.** — ⟨G.O.-E.⟩ — Heating w. conc. HCl gives acetophenone & some triphenylbenzene.
3955	199	1.112 (25/4)	**1^2-Chlorstyrene, $C_6H_5.CH{:}CHCl$.** — ⟨G.O.-E.⟩ — n_D = 1.5808–1.5736. — Odor like hyacinths. — Oxidize to benzoic ac.
3960	200–4; 130–40 (80)	.908 (19°) .887 (20°)	**Chlordecane fr. Petroleum, $C_{10}H_{21}Cl$.** — ⟨G.O.-E.⟩ — n = 1.4445
3965	200–4		**1^2-Chlorethylbenzene, $Ph.CH_2.CH_2Cl$.** — ⟨G.O.-E.⟩ — In distn. dec. largely to HCl & styrene.
3970	203–5		**1,6-Dichlorhexane, $CH_2Cl.(CH_2)_4.CH_2Cl$.** — ⟨G.O.-E.⟩
3975	205–6(sl.d.)		**4-Chlorisopropylbenzene, $Cl.C_6H_4.C_3H_7$.** — ⟨G.O.-E.⟩ — (T. **4**.4a, negative.)
3980	213–4 (736) (th.i.)	1.018	**3-Chlorcymene, 3-Chlor-1,4-methylisopropylbenzene, $Cl.C_6H_3.Me,C_3H_7$.** — ⟨G.O.-E.⟩ — (Fr. thymol + PCl_5).
3985	216–8 (746) (th.i.)	1.014 (14°)	**2-Chlor-1-methyl-4-isopropylbenzene, 2-Chlorcymene, $Cl.C_6H_3.Me,C_3H_7$.** — ⟨G.O.-E.⟩ — Nitric ac. of sp. gr. 1.24 oxid. to 2-chlor-p-toluic ac. (No. **3**.1960). — (T. **4**.4a, negative.)
3990	219–20 (th.i.)		**1^3-Chlorpropylbenzene, $Ph.CH_2.CH_2.CH_2Cl$.** — ⟨G.O.-E.⟩ — V. stable. — (Boiling alc.-KOH removes Cl.)
3995	220 (749)	.998 (8°)	**Pelargonyl Chloride, $C_8H_{17}.COCl$.** — ⟨T. **4**.11.⟩
4000	220–24		**Chlorundecane (fr. Petroleum), $C_{11}H_{23}Cl$.** — ⟨G.O.-E.⟩
4005	210–225		**Chlorundecene (fr. Hendekanaphthene), $C_{11}H_{21}Cl$.** — ⟨G.O.-E.⟩
4010	222	1.141 (13.2°)	**α-Chlor-n-valerianic Ac., $Pr.CHCl.CO_2H$.** — ⟨T.**4**.3⟩ — M.p. – 15°. — I. aq.; s. alc., eth.
4015	220–8 (760)	.888 (20°)	**Chlorundecene (fr. Canadian Pet.,), $C_{11}H_{21}Cl$.** —⟨G.O.-E.⟩ — n = 1.4461.
4020	225–9		**1^1-Chlorcymene, Cumyl Chloride, $C_3H_7.C_6H_4.CH_2Cl$.** — ⟨G.-O.-E.⟩ — Boiling dec. to $C_{20}H_{24}$. — Boiled w. aq.-PbN_2O_6 sol. gives cuminol. — Na amalgam gives cymene.
4025	230–35	1.104 (0°)	**Dichlornononaphthylene, $C_9H_{16}Cl_2$.**
4030	235–40 (747)	1.013 (20°)	**Dichlor-n-decane (fr. Petroleum), $C_{10}H_{20}Cl_2$.** — ⟨G.O.-E.⟩ — n_D = 1.4604.
4035	240–42		**1,8-Dichloroctane, $CH_2Cl.(CH_2)_6.CH_2Cl$.** —⟨G.O.-E.⟩— Solid. to leafy mass in freezing mixt.
4040	256–8	1.070 (15°)	**Cuminyl Chloride, $p\text{-}Me_2CH.C_6H_4.COCl$.** — ⟨T. **4**.11⟩ — Rubbed w. ammon. carbonate gives amide: tbl.; **d.s. h.** aq.; m.p. 153.5°. — (M.p. of cuminic ac. 116°.)
4045	258–62 (sl.d.)		**1,9-Dichlornonane, $CH_2Cl.(CH_2)_7.CH_2Cl$.** — ⟨G.O.-E.⟩
4047	abt. 270 d.		**2,2-Dichlorundecane, $Me.CCl_2.(CH_2)_8.Me$.** — ⟨G.O.-E.⟩ — (Distn. dec. to HCl & undecine-(1).
4050	a. 289 d	.841 (12°)	**Cetyl Chloride, $C_{16}H_{33}Cl$.** — ⟨G.O.-E.⟩

CHAPTER IV

ORDER IV

COMPOUNDS CONTAINING BROMINE AS "ADDITIONAL ELEMENT"

GENERAL OBSERVATIONS

(A) **Color.** — Pronounced color is rare among the tabulated species of Order IV, less than a score, outside of the fairly well represented group of quinonic derivatives, being mentioned as colored. The exceptions are mostly yellowish bromination products of hydrocarbons having condensed carbocyclic skeletons like anthracene or of certain phenols.

(B) **Division and Sections.** — *Division A* contains all species that are solid at room temperature. It is not subdivided.

Division B contains all species that are liquid at room temperature. It contains two Sections. The species of *Section* 1 have a specific gravity higher than 1.50. The species of *Section* 2 have a specific gravity lower than 1.50. (Cf. T. 4.2.)

(C) **Odor** — (D) **Acidity** — (E) **Behavior toward Hot Alkali Solution.** (F) **Behavior toward Silver Solution.** (G) **Quantitative Determination of Bromine.** Read the " General Observations " under these letters at the beginning of Chapter III (page 21). These remarks, relating to the chlorine compounds of Order III, are equally applicable to the bromine compounds of Order IV.

ANALYTICAL TABLES

OF

ORDER IV

COMPOUNDS CONTAINING BROMINE AS "ADDITIONAL ELEMENT"

DIVISION A, SOLID SPECIES

No.	Melting-point (C°.)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	–15	**Dodecylene Bromide, $C_{12}H_{24}Br_2$.** — ⟨G.O.-E.⟩
55	–4	**d,l-α-Brombutyric Ac., $Et.CHBr.CO_2H$.** — ⟨T. **4**.3a⟩ — B.p. 127–8° (25 mm.). — Sp. gr. 1.567 (20/20). — S. in 15 pt. c. aq.— (k @ 25° = 1.06×10^{-3}) — Alk. removes Br easily) — Salts cryst. poorly. — Amide: cryst. fr. bz.; m.p. 112°; 108°.
60	0	**Tetradecylene Bromide, $C_{14}H_{28}Br_2$.** — ⟨G.O.-E.⟩
	4	**p-Bromphenetole.** — Cf. No. **4**.4852. — B.p. 233°.
65	7	**2,3-Dibrom-2-methylbutane, $Me_2CBr.CHBr.Me$.** — ⟨G.O.-E.⟩ — B.p. 57° (14 mm.) — (Boiling w. alc.-KOH gives $Me_2C:CBr.Me$.)
	9–10	**p-Bromanisole.** — Cf. No. **4**.4842. — (B.p. 223°c.)
70	10–11	**1,2,2,3-Tetrabrompropane, Allylene Tetrabromide, $CH_2Br.CBr_2.CH_2Br$.** — ⟨G.O.-E.⟩ — B.p. 215–30°d. — Sp. gr. 2.653 (18/0). — Odor camphor-like!
75	9–10	**(α)-2,5-Dibromfurane, ⌜CH:CBr.O.CBr:CH⌝.** — B.p. 164–5° (764 mm.) (dec.) — Oxid. rapidly in air to amorph. i. comp., or when covered w. aq., to valeric ac. — Adds 4 Br.
	9	**Bromoform.** — Cf. B.p. 146°, No. **4**.4055.
80	13.5	**Cetene Bromide, $C_{16}H_{32}Br_2$.** — ⟨G.O.-H.⟩ — B.p. 225–27° (15 mm.).
85	14–15	**1-Brompentadecane, $C_{15}H_{31}Br$.** — ⟨G.O.-H.⟩
90	15	**Cetyl Bromide, $C_{16}H_{33}Br$.** — ⟨G.O.-H.⟩
95	15–16°	**1,8-Dibromoctane.** — Cf. b.p. 270–2°.
100	17–18°	**β-Brombutyric Ac., $Me.CHBr.CH_2.CO_2H$.** — ⟨T. **4**.3⟩ — W. c. normal KOH sol. gives crotonic ac. (Vol. I).
105	20	**Diethylbromacetic Ac., $Et_2BrC.CO_2H$.** — ⟨T. **4**.3⟩ — Scales. — I. aq.; misc. org. solvents. — (Loses HBr e. on distn. Unstable to aq.)
110	21–2	**o-Brombenzaldehyde, $Br.C_6H_4.CHO$.** — B.p. 230°. — Oxid. easily in air.
115	22	**α,β-Dibromisobutyric Ac., $CH_2Br.CBrMe.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst. — Boiled w. baryta sol. gives methacrylic ac. & HBr.
120	24–5	**3-Brom-2,2-dimethylbutane, $Me_3C.CHBr.Me$.** — ⟨G.O.-E.⟩ — B.p. 132°d.
122	24–5; 12	**2-Brom-2,3-dimethylbutane, "Pinacoline-alcohol Bromide," $Me_2CH.-CBrMe_2$.** — ⟨G.O.-E.⟩ — White mass. — B.p. 132° (sl.d.) — Sapon. by aq. gives 2,3-dimethylbutanol-(2) & tetramethylethylene.
125	24	**Octadecylene Bromide, $C_{18}H_{36}Br_2$.** — ⟨G.O.-E.⟩ — Silvery lft. fr. alc. — D.s. alc.

No.	Melting-point	"ADDITIONAL ELEMENT" — BROMINE. — SOLIDS.
130	24	**s-Dibromacetone, $(CH_2Br)_2.CO$.** — ⟨G.O.-E.⟩ — Ndl. e.s. CS_2. — Decd. on distn.
135	25.7c.	**d,l-α-Brompropionic Ac., $Me.CHBr.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 203.5°c. (205.5 mm.) (sl.d.) — Cryst. — Melted and cooled to − 30° gives metastable form: m.p. − 3.9°c. — Boiled w. aq. & $CaCO_3$, or w. NaOH, gives chiefly lactic ac. (Vol. I.) — $Pb\bar{A}_2$: cryst. ppt.; v.d.s. alc. — Et$\bar{A}$: b.p. 162° — Amide: ndl. fr. alc.; m.p. 123°.
140	27	**Elaidic Ac. Dibromide, 9,10-Dibromoctadecaneoic-(1), Ac., $Me.(CH_2)_7.CHBr.CHBr.(CH_2)_7.CO_2H$.** — ⟨T. **4**.3 in alc.⟩ — Cryst. — Na amalgam gives elaidic ac. — Sapn. w. alk. gives mixed dioxystearic acids.
145	28	**p-Bromtoluene, $Br.C_6H_4.Me$.** — ⟨G.O.-E.⟩ — B.p. 185° (th.i.). Sp. gr. 1.3898 (20/4) — Unlike o-comp easily decd. in eth. sol. by Na, giving bitolyl & toluene. — Oxidn. gives p-brombenzoic ac. — T. **4**.4a, negative.
150	30.5	**α-Bromtridecylic Ac., $Me.(CH_2)_{10}.CHBr.CO_2H$.** — ⟨T. **4**.3⟩ — Cryst.
155	30	**o-Brombenzyl Bromide, 1¹2-Dibromtoluene, $Br.C_6H_4.CH_2Br$.** — ⟨G.O.-E.⟩ — Odor irritating! — Cryst. at 0° in rhomb. cryst. — Dist. w. decn. — **Vol.** w. st. — ("Not attacked by CrO_3 mixt.")
160	30–31	**2,3-Dibromtoluene, $Br_2.C_6H_3.Me$.** — ⟨G.O.-E.⟩ — Dil. HNO_3 oxidn. @ 130° gives 2,3-dibrombenzoic ac.: m.p. 146–8°.
165	30	**5-Brom-1,2,3,4-tetramethylbenzene, $Br.C_6H.Me_4$.** — ⟨G.O.-E.⟩ — B.p. 265°. — Decd. by warm H_2SO_4 to prehnitol.
170	31; 26	**β-Bromstilbene, $Ph.CBr:CHPh$.** — ⟨G.O.-E.⟩ — **Lft.** fr. alc. — Alc.-KOH gives tolane; Na amalgam gives stilbene.
175	32–3	**γ-Brombutyric Ac., $CH_2Br.CH_2.CH_2.CO_2H$.** — ⟨T. **4**.3⟩ — Et$\bar{A}$: b.p. 196–7°; sp. gr. 1.36.
180	32–3	**m-Bromphenol, $Br.C_6H_4.OH$.** — ⟨G.O.-D.⟩ — B.p. 236–6.5° — Odor sl. less unpleasant than o-comp. — Fusion w. KOH gives resorcinol & protocatechol.
185	32	**2,3-Dibrombutanol-(1), $Me.CHBr.CHBr.CH_2OH$.** — ⟨G.O.-E.⟩ — **Pr.** fr. pet.-eth. — (Boiling w. aq. replaces Br by OH).
190	32	**Phenyl Bromacetate, $BrCH_2.CO_2Ph$.** — ⟨G.O.-E.⟩ — **Lft.** fr. alc.
195	34; 35	**μ-or-γ-Brombrassidic Ac., $C_{22}H_{41}O_2Br$.** — ⟨T. **4**.3 in alc.⟩ — Gran. cryst. mass. — I. aq.; e.s. alc., eth. — (W. Na in alc. sol. gives brassidic ac.)
200	34.5–5	**β-Brom-n-caproic Ac., $Me.CH_2.CH_2.CHBr.CH_2.CO_2H$.** — ⟨T.**4**.3⟩ — Ndl. e.s. chlf., bz., lgr. — (Decd. by boiling w. aq.)
202	35	**2,6-Dibrom-2,6-dimethylheptane, $Me_2CBr.CH_2.CH_2.CH_2.CBrMe_2$.** —⟨G.O.-E.⟩ — Ndl. fr. MeOH — (Loses HBr in vacuo.)
205	35.5	**1¹-Brom-1,4-dimethylbenzene, $CH_2Br.C_6H_4.Me$.** — ⟨G.O.-E.⟩ — B.p. 218–20° (740 mm.) — Long ndl. — V.s. h. eth., chlf.
210	36	**1²,1²-(ω)-Dibromacetophenone, $Ph.CO.CHBr_2$.** — ⟨G.O.-E.⟩ — Rhomb. tbl. fr. chlf. — Boiled w. Na_2CO_3 sol. gives benzoic ac. — Alc. $(NH_4)_2$ sol. gives indigo! — Shaken in bz. sol. w. conc. aq.-NH_3 gives isoindileucin: yel. lft.; i. aq., bz.; m.p. 191–2°.
215	37–8	**1,1,1,3-Tetrabromacetone, $CBr_3.CO.CH_2Br$.** — ⟨G.O.-E.⟩ — Ndl. — NH_3 gives bromoform & bromacetamide. — $\bar{C}.4H_2O$. Cryst., m.p. 62°.
220	37.5–8	**1¹-Brom-1,3,5-trimethylbenzene, $CH_2Br.C_6H_3.Me_2$.** — ⟨G.O.-E.⟩ — B.p. 229–31° (740 mm.) (sl.d.) — E.s. alc., eth., chlf.
225	38	**Undecylenic Acid Dibromide, $CH_2Br.CHBr.(CH_2)_8.CO_2H$.** — ⟨T. **4**.3⟩ — (Alc.-KOH eventually removes all Br.)
230	abt. 38	**α-1,2,3,4-Tetrabrombutane, $CH_2Br.(CHBr)_2.CH_2Br$.** — ⟨G.O.-E.⟩ — (Lower melting deriv. fr. butadiene — (1.3) & Br.) — Odor camphor-like. — V.s. alc., eth., lgr. — (Alc. KOH gives same products as modif. of m.p. 118°.)
235	38.2	**2,5-Dibromhexane (meso), $Me.CHBr.(CH_2)_2.CHBr.Me$.** —⟨G.O.-E.⟩— B.p. 210° — E.s. org. solv.
240	39–40	**δ-Brom-n-valerianic Ac., $CH_2Br.(CH_2)_3.CO_2H$.** — ⟨T. **4**.3⟩ — **Pr.** fr. **pet-eth.**

No.	Melting-point	"ADDITIONAL ELEMENT" — BROMINE. — SOLIDS.
242	39–40; 32–3	**μ-or-ν-Brombehenic Ac., $Me.(CH_2)_8.CHBr.(CH_2)_{11}.CO_2H$.** — ⟨T. **4**.3 in alc.⟩ — Pr. fr. alc. — E. s. org. solv. — (Fr. erucic ac. & HBr.)
245	39	**3,5-Dibromtoluene, $Br_2.C_6H_3.Me$.** — ⟨G.O.-E.⟩ — B.p. 246° — Ndl. — Oxidn. gives 3,5-dibrombenzoic ac. — ⟨T. **4**.4a, negative.⟩
250	40; 35–6	**2,4-Dibromphenol, $Br_2.C_6H_3.OH$.** — ⟨G.O.-D.⟩ — B.p. 238–9°c. — Cryst. w. faint, persistent, unpleasant odor. — 1000 c.c. aq. at 15° dis. 1.94 g. — V.s. alc., eth., bz., CS_2 — W. HNO_3 easily gives picric ac. (No. **2**.3168.) — Methyl Eth.: scales; m.p. 59° (Fr. MeI & KOH).
255	40; 50	**Diphenylbromethylene, $Ph_2C:CHBr$.** — ⟨G.O.-E.⟩ — B.p. a. 300° — D.s. c. alc.; e.s. eth., CS_2. — Adds $Br._2$ — CrO_3 mixt. attacks with great dif.
260	41	**9 or 10-Octadecanoic(1) Ac., $Me.(CH_2)_8.CHBr.(CH_2)_7.CO_2H$.** — ⟨T. **4**.3 in alc.⟩
265	41	**m-Brombenzyl Bromide, $Br.C_6H_4.CH_2Br$.** — ⟨G.O.-E.⟩ — Odor irritating! — Lft. or. ndl. — D.vol.w.s. — ("CrO_3 mix. does not attack.")
270	41.5–2.5	**α-Brommyristic Ac., $Me.(CH_2)_{11}.CHBr.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Ndl. fr. bz. — E.s. alc., eth., chlf.
275	42.5	**2-Brompentadecanoic(1) Ac., $Me.(CH_2)_{12}.CHBr.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Plates fr. dil. ac. ac. — E.s. alc., eth., chlf., pet-eth.
280	42–3	**μ,ν-Dibrombehenic Ac. Erucic Ac. Dibromide, $Me.(CH_2)_7.(CHBr)_2.(CH_2)_{11}.CO_2H$.** ⟨T. **4**.3a in alc.⟩ — Cryst warts. — Alc-KOH in cold gives brombrassidic ac. — (Tasteless, alm.i. Ca salt, patented for medicinal use as "Sabromin").
285	42–3	**1,1,1,3-Tetrabromacetone Hydrate, $CBr_3.CO.CH_2Br + 2H_2O$.** — ⟨G.O.-E.⟩ — Cryst. — I. aq. — (Decd. by ammon. to bromoform & bromacetamide.)
290	42	**2-Brombenzophenone, $Br.C_6H_4.CO.Ph$.** — Cryst. — (Pat.).
300	43.5c.	**d-α-Bromisovalerianic Ac., $Me_2CH.CHBr.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 95–100° (2 mm.). — S. in 70–80 pt. c. aq. — $(\alpha)_D^{20} = +9°$ for 0.0926 g. in 9.2791 g. aq. sol. — (N̄-Aq.-KOH sol. gives d-rot. α-oxyisovalerianic ac.)
305	43–5	**Dibromhydrindene, ⌜$C_6H_4.CH_2.CHBr.CHBr$⌝.** — S alc.; i. lgr. — (Aq. gives indeneoxybromide.)
310	44	**(i)α-Bromisovalerianic Ac., $Me_2CH.CHBr.CO_2H$.** — ⟨T. **4**.3⟩ — B.p. 230° (sl.d.) — Pr. fr. eth. — D.s. aq. — (Boiled w. aq. + $CaCO_3$ gives α-hydroxyisovalerianic ac.) — $Pb\bar{A}_2.HO_2$: cryst.; loses H_2O @ 80°; m.p. 100° d.
315	44.5	**$4^1,4^2$-Dibromethyltoluene, $Me.C_6H_4.CHBr.CH_2Br$.** — ⟨G.O.-E.⟩ — Ndl. fr. alc.
320	44	**1,2,4-Tribrombenzene, $C_6H_3Br_3$.** — ⟨G.O.-E.⟩ — B.p. 275–6° — D.s. alc.
325	44–4.7	**2,3,4-Tribromtoluene, $Br_3.C_6H_2Me$.** — ⟨G.O.-E.⟩.
327	44–6	**Isoerucic Ac. Dibromide, $C_{22}H_{42}O_2Br_2$.** — ⟨T. **4**.3a in alc.⟩
330	45	**Diphenylbrommethane, $Ph_2.CHBr$.** — ⟨G.O.-E.⟩ — Cryst. — V.s. bz. — Distn. gives tetraphenylethylene. — (Alc.-KOH acts violently giving benzhydrolethylether.).
335	44–5; 47	**4-Brompropiophenone, $Br.C_6H_4.CO.Et$.** — ⟨G.O.-E.⟩ — Ndl. — Odor aromatic! — S. alc., CS_2. — On oxidn. yields p-brombenzoic ac.
340	46–7	**Behenolic Acid Dibromide, $Me.(CH_2)_7.CBr:CBr.(CH_2)_{11}.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Lft. — W. alc.-KOH @ 150° gives behenolic ac.
345	47.5	**Brompentaethylbenzene, $Br.C_6Et_5$.** — ⟨G.O.-E.⟩ — B.p. 315° — Long ndl. — R.d.s. c. alc. — ⟨T. **4**.a, negative⟩.
350	48; 48–9	**α-Bromisobutyric Ac., $Me_2.CBr.CO_2H$.** — ⟨T. **4**.3a⟩ — B.p. 198–200°. — Liquifies & sinks as oil on contact w. aq. — Heated w.N KaOH, or even w. aq., gives α-oxyisobutyric ac.
355	48	**Dibromacetic Ac., $Br_2CH.CO_2H$.** — ⟨T. **4**.3⟩ — Deliq. cryst. mass. — Salts generally cryst. well and are sol. — $Ag\bar{A}$: ndl. d.s. aq.; decd. to AgBr, etc. on boiling w. aq.
360	49–50	**β,γ-Dibrombutyric Ac., $CH_2Br.CHBr.CH_2.CO_2H$.** — ⟨T. **4**.3α⟩ — Cryst. fr. CS_2. — (Boiling w. aq. gives β-oxybutyrolactone.)

No.	Melting-point	“ ADDITIONAL ELEMENT ” — BROMINE. — SOLIDS.
365	49	**3,4-Dibrom-2,3-dimethyl-butene-(1), $CH_2Br.CMeBr.CMe{:}CH_2$.** — ⟨G.O.E.⟩ — Odor unpleasant. — Ndl. fr. pet-eth. — Br. in pet-eth. gives a tetrabromide.
370	50–1; 49–50	**Bromacetic Ac., $BrCH_2.CO_2H$.** — ⟨T. **4**.3a⟩ — B.p. 208°; 196°. — Sharp smelling deliq. rhombohedra. — Blisters skin. — R.Ā: liq. — $Pb\bar{A}_2$: lft., d.s. c. aq.; s. h. — AgĀ: cryst. ppt.; explodes at 90°. — Heated w. Ag. powd. @ 130° gives succinic ac.
375	50	**1^2-(ω)-Bromacetophenone, Phenacyl Bromide, $Ph.CO.CH_2Br$.** — ⟨T. **4**.3⟩ — *Vapor causes copious flow of tears!* — Pr. fr. dil. alc. — E.s. alc., eth., chlf. — Not decd. by boiling aq. — Titrates w. phenolphthalein as monobasic ac. neutralizing c. decinormal NaOH *v. slowly!* (The cold titration by **T.1**.301 requires nearly half an hour.) — 1 g. in 4 g. c. alc. w. 1 g. aniline after long standing gives phenacylanilide: ndl. fr. alc. on slow evapn. of alc. sol.; i. aq.; e. vol. w. st.; m.p. abt. 93°.
380	51.5–2	**α-Brompalmitic Ac., $Me.(CH_2)_{13}.CHBr.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Lust. scales fr. lgr. — E.s. alc., eth., bz., chlf., CS_2, lgr. — (EtĀ: oily).
385	51–2	**2-4^1-Dibrombenzophenone, $(C_6H_4Br)_2.CO$.** — ⟨G.O.-E.⟩
390	52–3	**γ,γ-Dibromvalerianic Ac., $Me.CBr_2.CH_2.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Plates fr. pet-eth.
392	52.5	**α-Bromhexadecane-α-carbonic Ac., $Me.(CH_2)_{14}.CHBr.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Plates fr. dil. ac. ac. — E.s. alc., eth. — KOH sol. replaces Br. by OH.
400	52–3	**Hexabrom-2-methylpropene-(1), $C_4H_2Br_6$.** — ⟨G.O.-E.⟩ — Cryst. — E.s. alc.-Sl. vol. w. st.
405	52–3	**Bromacenaphthene, $Br.C_{12}H_9.C_2H_4$.** — Tbl. fr. alc.
410	52–3	**2,3,5-Tribromtoluene, $Br_3.C_6H_2Me$.** — ⟨G.O.-E.⟩ — Flat ndl. fr. alc.
415	54	**β-Bromstearic Ac., $Me.(CH_2)_{14}.CHBr.CH_2.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Lft. fr. pet-eth. — (Alc.-KOH gives octadecene-(2)-oic(1) ac., & β-oxystearic ac.)
420	53.5	**Bromal Hydrate, $CHBr_3.CHO.H_2O$.** — ⟨G.O.-E.⟩ — (Dried in vac. over $CaCl_2$) — Distn. gives bromal (b.p. 174°) & aq.
425	53–4	**1,2,5,6-Tetrabromhexane, $CH_2Br.CHBr.(CH_2)_2.CHBr.CH_2Br$.** —⟨G.O.-E.⟩ — Cryst. — (Lower melting stereoisomer.)
430	53–4	**(α form)-1,4-Dibrombutene-(2), $CH_2Br.CH{:}CH.CH_2Br$.** — ⟨G.O.-E.⟩ — B.p. 92–3° (15 mm.) — V. vol. — Provokes tears. — E.s. org. solv. — (KOH @ 75° removes HBr.)
432	54	**Brassidic Ac. Dibromide, $Me.(CH_2)_7.CHBr.CHBr.(CH_2)_{11}.CO_2H$.** — ⟨T. **4**.3, in alc.⟩ — Cryst. fr. alc. — Alc.-KOH attacks only @ high temp.
435	54; 53; 56–7; 54.5	**Pentabromethane, $CBr_3.CHBr_2$.** — ⟨G.O.-E.⟩ — Sp. gr. 3.312 — Ndl. s. alc.; v.s. eth.
440	55–6	**2,6-Dibromphenol, $Br_2.C_6H_3.OH$.** — ⟨G.O.-D.⟩ — Felted ndl. fr. aq. — Sbl. in scales at room temp. — E.s. alc., eth.
445	56–7	**3,5-Dibromcresol-(2), $Br_2.C_6H_2.MeOH$.** — ⟨G.O.-D.⟩ — Cryst. fr. alc. — E. vol. w. st.
450	55–6	**Brombenzoquinone, $C_6H_3BrO_2$.** — Overlapping tbl. — E.s. alc., eth., chlf., bz.; less s. lgr., h. aq. — Ⓟ. S. in alk. w. green color, quickly changing to black-brown! — Colors skin red-brown. — Changes to sticky mass on keeping.
452	55–6	**6-Bromthymol, $Br.C_6H_2.Me(C_3H_7)$ (HO).** — ⟨G.O.-D.⟩ — Tbl. fr. lgr.
455	56	**Tetrabromethene, Perbromethylene, $CBr_2{:}CBr_2$.** — ⟨G.O.-E.⟩ — B.p. 226–7°c. — Tbl. fr. dil. alc. — Sbl. in tbl.
460	56	**β-Naphthyl Bromide, $C_{10}H_7.CH_2Br$.** — ⟨G.O.-E.⟩ — B.p. 213° (100 mm.) — Fatty lft. fr. alc.
465	57–8	**γ,δ-Dibromvalerianic Ac., $CH_2Br.CHBr.CH_2.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Lft. fr. CS_2. — C. Na_2CO_3 sol. gives valerolactone.
470	57	**p-Brombenzaldehyde, $Br.C_6H_9.CHO$.**

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
475	58–9	**α,β-Dibrombutyric Ac., "Isocrotonic Ac. Dibromide," $Me.CHBr.CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Ndl. fr. lgr. — Deliq. — (W. aq-KOH gives mixture of α-bromcrotonic acids.)
480	58–9	**2,5,6-Tribromtoluene, $Br_3.C_6H_2Me$.** — ⟨G.O.-E.⟩ — Ndl.
485	58.5	**Dibromphenyl Eth., $(C_6H_4Br)_2O$.** — ⟨G.O.-E.⟩ — B.p. a. 360°. — Lft. fr. alc. — E.s. alc., eth., bz.
490	59–60	**α-Bromvalerianic Ac., $Et.CHBr.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Pr. fr. lgr. — Alm. i. c. aq.; e.s. eth., chlf., CS_2; d.s. bz., lgr. — Loses HBr on boiling w. aq.
495	59	**2-(β)-Bromnaphthalene, $C_{10}H_7Br$.** — B.p. 281–2°c. (760 mm.) — Sp. gr. 1.605 (0°) — S. in 16 pt. 92% alc. @ 20°. — V.s. eth., chlf., bz. — Picrate: yel. ndl.; m.p. 86°; 79°; s.alc.
500	60	**α-Bromstearic Ac., $Me.(CH_2)_{15}.CHBr.CO_2H$.** — ⟨T. 3a, in alc.⟩ — Lust. ndl. or tbl. fr. lgr. — E.s. alc., eth., chlf., CS_2. — Alc.-KOH replaces Br by OH, also removes HBr.
505	60–1	**8-Bromnaphthol-(1), $Br.C_{10}H_6.OH$.** — Tbl. fr. lgr.
510	60	**2,4-Dibrom-1,3,5-trimethylbenzene, $Br_2C_6H.Me_3$.** — B.p. 285°; 276–8°. — Ndl.
515	61	**α,α-Dibrompropionic Ac., $Me.CBr_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — B.p. 200–21° (sl.d.). — Rhomb tbl. — (Boiling alc.-KOH removes all, or half, the Br.) — (Salts fairly stable. Strong acid.) — W. 1 mol. Ag_2CO_3 in aq. sol. gives pyruvic ac. readily.
520	61.5	**2,2,3-Tribrompropionic Ald., Glycerine Bromal, $CH_2Br.CBr_2.CHO + 2H_2O$.** — ⟨G.O.-E.⟩ — (Fr. glycerine + HBr + H_2SO_4) — Cryst. — D.s. aq., alc.; e.s. eth. — Vol. w. st. — KOH sol. gives 1,1-dibromethylene, HBr & formic ac. — Distn. gives $CH_2:CBr_2$.
525	61	**Methyl 5-Bromsalicylate, $Br(HO).C_6H_3.CO_2Me$.** — ⟨G.O.-D.⟩ — B.p. 264–6° Tbl. fr. CS_2. — D.s. c. MeOH. — (Fr. Br. & oil of wintergreen.)
530	61	**p-Brombenzylbromide, 1^1,4-Dibromtoluene, $Br.C_6H_4.CH_2Br$.** — ⟨G.O.-E.⟩ — Ndl. fr. alc. — Vol. w. st. — D.s. aq.; c. alc.; e.s. h. CS_2, eth. — Boiling alc-KOH gives p-brombenzyl alc. & ethyl p-brombenzoate.
535	61	**1,6-Dibromnaphthalene, $C_{10}H_6.Br_2$.** — Ndl. — E.s. alc.
540	61	**3-Brom-1,2,4,5-tetramethylbenzene, $Br.C_6H.Me_4$.** — ⟨G.O.-E.⟩ — B.p. 262–3° — Pearly lft. fr. alc. — D.s. c. alc.; v.s. eth., bz.
545	62.5	**β-Brompropionic Ac., $CH_2Br.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Tbl. — E.s. aq., alc., eth. — NaOH sol. gives acrylic & hydracrylic ac. — (EtÅ, liq.)
550	62–4	**α-Bromarachidic Ac., $Me.(CH_2)_{17}.CHBr.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Cryst. fr. lgr. — E.s. alc., eth., chlf.
555	61.5–3; 62–4	**Dimethyl s-Dibromsuccinate, $CO_2Me.CHBr.CO_2Me$.** — ⟨G.O.-E.⟩ — Sapn. gives MeOH.
560	68; 58	**Diethyl s-Dibromsuccinate, $CO_2Et.(CH.Br)_2.CO_2Et$.** — ⟨G.O.-E.⟩ — Sapn. gives EtOH.
565	63–4	**p-Bromphenol, $Br.C_6H_4.OH$.** — ⟨G.O.-D.⟩ — B.p. 235–6°; 238°. — Tetrag. cryst. fr. chlf. — (Traces of aq. lower m.p. greatly & prevent crystallization.) — E.s. alc., eth., chlf., gl.ac.ac. — Fusion w. KOH gives resorcinol & protocatechol. — (Methyl eth. liq.)
570	63–4	**2,2,3,4-Tetrabrombutenal-(1), $CH_2Br.CHBr.CBr_2.CHO$.** — ⟨G.O.-E.⟩ — Pr. fr. eth. — Vol. w. st. — D.s. aq.; e.s. org. solv. — (No hydrate or bisulphite comp.) — E.s. alc., eth., chlf., gl.ac.ac. — Fusion w. KOH gives resorcinol & protocatechol. — (Methyl eth. liq.)
570	63–4	**2,2,3,4-Tetrabrombutenal-(1), $CH_2Br.CHBr.CBr_2.CHO$.** — ⟨G.O.-E.⟩ — Pr. fr. eth. — Vol. w. st. — D.s. aq.; e.s. org. solv. — (No hydrate, bisulphite comp., or semicarbazone.)
572	63–4	**1,2,4,5-Tetrabromhexane, $Me.CHBr.CHBr.CH_2.CHBr.CH_2Br$.** — ⟨G.O.-E.⟩ — Pearly lft. fr. chlf. — V.s. eth., chlf., bz.
575	63.6	**3,6-Dibrom-1,2,4-trimethylbenzene, $Br_2.C_6H.Me_3$.** — ⟨G.O.-E.⟩ — **B.p. 293–4°** (th.i.) — **Lust ndl. fr. alc. — S. alc.; v.s. eth., chlf., bz.**

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
580	64	**α,β-Dibrompropionic Ac., $CH_2Br.CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — B.p. 220–40°d. — Tbl. — Heated above m.p. and allowed to solidify gives a metastabile modif.; compact pr., m.p. 51° (wh. in time change to original stable form.) — 1 pt. aq. @ 11° dis. 19.45 pt.; 1 pt. eth. @ 10° dis. 3.04 pt. — Alc-KOH gives bromacrylic ac., etc., easily; or, acetylene on long boiling w. x.s. KOH.
585	64	**5-Bromcresol(2), $Br,Me.C_6H_3.OH$.** — ⟨G.O.-D.⟩ — B.p. 235° — Sbl. — Ndl. fr. alc.
590	64–5	**Tetrabromfurane, C_4Br_4O.** — Silky ndl. fr. alc. — E.s. h. alc. — Adds Br_2. — Boiling w. Br water gives dibrommaleic ac.
595	64	**β-Tolane Dibromide,PhCBr:BrCPh.** — ⟨G.O.-E.⟩ — Long ndl. — E.s. alc., eth. — Alc-KOH gives tolane (Vol. 1).
600	64–5	**1,2,5,6-Tetrabromhexane, $CH_2Br.CHBr.(CH_2)_2.CHBr.CH_2Br$.** — ⟨G.O.-E.⟩ — Cryst. — E.s. alc., eth., bz.; less s. lgr.
605	65–5.5	**β-γ-Dibromvalerianic Ac., $Me.CHBr.CHBr.CH_2.CO_2H$.** —⟨T. **4**.3a.⟩— Cryst. fr. lgr.
610	65	**β-Naphthoquinone Dibromide,$C_{10}H_6Br_2O_2$.** — ⟨G.O.-A.⟩ — *Yel.* cryst. fr. bz. + lgr! — V. unstable, giving brom-β-naphthoquinone when warmed w. gl. ac. ac.
615	66	**α,β-Dibrompalmitic Ac., $Me.(CH_2)_{12}.CHBr.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Pr. fr. pet-eth. — D.s. c. pet-eth.
617	66.5	**α-Bromcerotic Ac., $Me.(CH_2)_{23}.CHBr.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Ndl. fr. bz.
620	66.4	**$1^1,3^1$-Dibrommesitylene, $(CH_2Br)_2.C_6H_3.Me$.** — ⟨G.O.-E.⟩ — Pr. — E.s. eth., h. alc.; alm.i. c. alc.
625	66	**2,4,6-Tribromtoluene, $Br_3.C_6H_2Me$.** — ⟨G.O.-E.⟩ — B.p. 290° — Long ndl. fr. bz. — V.d.s. alc.
630	67–8	**1,2-Dibromnaphthalene, $Br_2.C_{10}H_6$.** — Oblique rhomb. cryst. fr. alc.
635	68; 69–70	**α-Bromacrylic Ac., $CH_2:CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Dec. on distn. — Cryst. — Vol. in air. — E.s. aq., alc. — Dec. in light. — Boiled w. 2 equiv. NaOH sol. gives acetylene! — Over conc. H_2SO_4 in dark changes to porous i. β-acrylcolloid. — AgĀ: lft. d.s. aq.
640	68	**1,4-Dibrom-2,4-dimethylpentane, $CH_2Br.CMe_2.CH_2.CBrMe_2$.** — ⟨G.O.-E.⟩— B.p. 102–3°(14 mm.)
645	68.5–69; 71	**2,5-Dibrom-2,5-dimethylhexane, $Me_2CBr.CH_2.CBrMe_2$.** — ⟨G.O.-E.⟩ — Lft. s. alc., eth., bz., chlf. — Unstable, changing slowly to liq. of pungent odor.
650	69–70	**Brombenzyl Benzoate, $PhCO_2.CHBr.Ph$.** — ⟨G.O.-E.⟩ — Pr. e.s. alc., eth., chlf. — Dec. on keeping or distn. to benzaldehyde & benzoyl bromide.
655	70	**α-Brombehenic Ac., $Me.(CH_2)_{19}.CHBr.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Cryst. fr. alc. — S. usual org. solv.
660	70	**9,9,10,10-Tetrabromoctadecanoic-(1) Ac., "Stearolic Ac. Tetrabromide," $Me.(CH_2)_7.CBr_2.CBr_2.(CH_2)_7.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Leafy cryst. fr. alc.
665	70 (sl.h.); 82–4 (r.h.)	**Polymeric Acrolein Dibromide, $(CH_2Br.CHBr.CHO)_x$** — ⟨G.O.-E.⟩ — Ndl. fr. chlf. liable to rapid change to amorph. comp.
670	71	**β,β Dibrompropionic Ac., $CHBr_2.CH_2.CO_2H$.** — ⟨G.O.-E.⟩ — Rhomb. pr. — Alc-KOH gives HBr & β-bromacrylic ac.
675	70.5–1.5	**α,β-Dibromcaproic Ac., $Me.CH_2.CH_2.CHBr.CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Lft. fr. CS_2 — E.s. chlf., bz., CS_2; less s. lgr.
680	72	**α,β-Dibromstearic Ac., $Me.(CH_2)_{14}.CHBr.CHBr.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Pr. fr. pet-eth. — S. org. solv.
685	72–3	**1^2-Bromcinnamic Ald., $C_6H_5.CH:CBr.CHO$.** — ⟨G.O.-E.⟩ — Lust. Monoclin. cryst. fr. eth. — V. stable.
690	72	**4,6-Dibrom-1,3-dimethylbenzene, $Br_2.C_6H_2Me_2$.** — ⟨G.O.-E.⟩ — B.p. 255–6.

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
695	73.5	**β-Bromisovalerianic Ac., $Me_2CBr.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — **Ndl. fr. lgr.** — E.s. alc., eth., bz.; alm.i. c. lgr.
700	73.5–4	**Dihydronaphthalene Dibromide, $C_{10}H_{10}Br_2$.** — Monoclin. cryst. — V. e. decd. by heat, alc-KOH, or c. conc. H_2SO_4, to HBr & naphthalene.
705	73	**5-Brom-1,2,4-trimethylbenzene, $Br.C_6H_2Me_3$.** — ⟨G.O.-E.⟩ — B.p. 233–5° — Lust. scales.
710	74	**Styrene Bromide, $1^1,2^1$-Dibromethylbenzene, $C_6H_5.CHBr.CH_2Br$.** — ⟨G.O.-E.⟩ — B.p. 139–41°(15 mm.) — (Warmed w. alc.-KOH gives ω-bromstyrene, C_8H_7Br.)
715	75.5	**2,5-Dibrom-1,4-dimethylbenzene, $Br_2.C_6H_2.Me_2$.** — ⟨G.O.-E.⟩ — B.p. 261°. — Tbl. fr. alc.
720	75	**1,7-(2,8)-Dibromnaphthalene, $C_{10}H_6.Br_2$.** — Flat ndl. fr. dil. alc. — (Fr. 2-bromnaphthalene-8-sulphonic ac. & PBr_5).
725	76.5	**3,5-Dibromphenol, $Br_2.C_6H_3.OH$.** — ⟨G.O.-D.⟩ — Cryst. fr. **lgr.** — D. s. aq., lgr.; e.s. alc., eth. — Colored violet by $FeCl_3$! — Fusion w. KOH gives phloroglucinol. (Vol. I). — (Methyl Eth.: pr.; m.p. 37–8°.)
730	76	**Pentabromacetone, $CBr_3.CO.CHBr_2$.** — ⟨G.O.-E.⟩ — Odor penetrating & characteristic! — Pr. fr. eth. — I. aq.; e.s. org. solv. — Sbl. — Dil. NaOH gives bromoform! (No. **4**.4055.)
735	75; 77	**p-Brombenzyl Alc., $Br.C_6H_4.CH_2OH$.** — ⟨G.O.-E.⟩ — D. vol. w. st. — Flat ndl. — V.d.s. c. aq.; more s. h.; e.s. alc., eth., CS_2, bz.
740	76–8	**d-Phenylbromacetic Ac., $Ph,Br.CH.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. fr. CS_2 — $(\alpha)_D = +45.4°$ in bz.; c = 8. — Shows auto-racemization.
745	77	**$1^1,3^1$-Dibrom-1,3-dimethylbenzene, $C_6H_4(CH_2Br)_2$.** — ⟨G.O.-E.⟩ — Sp.gr. = 1.959(0°). — Pr.-ndl. fr. chlf. — S. in 3 pt. lgr.; more s. chlf., eth. — $KMnO_4$ oxidn. gives isophthalic ac. (Vol. I.)
750	77	**5,6-Dibrom-1,2,3,4-tetraethylbenzene, $Br_2.C_6.Et_4$.** — ⟨G.O.-E.⟩ — B.p. a. 330° d. — Cryst. — E.s. alc.
752	77–8	**μ,μ,r,r-Tetrabrombehenic Ac., $Me.(CH_2)_7.CBr_2.CBr_2.(CH_2)_{11}.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — Lft. fr. alc. — Na amalgam & alc. give behenolic ac.
755	79–80	**3,4-Dibromphenol, $Br_2.C_6H_3.OH$.** — ⟨G.O.-D.⟩ — Ndl. fr. aq. — Deliq. in alc.; e.s. eth. — Colored violet by $FeCl_3$!
757	79.5	**α-Brommelissic Ac., $Me.(CH_2)_{27}.CHBr.CO_2H$.** — ⟨T. **4**.3a, in alc.⟩ — **Cryst.** grains.
760	80	**o-Brombenzyl Alc., $Br.C_6H_4.CH_2OH$.** — ⟨G.O.-E.⟩ — Flat ndl. — E. vol. w. st. — D.s. c., s. h. aq., lgr.; e.s. alc., eth.
765	81.5–2	**Tribromlevulinic Ac., $C_4H_4Br_3O.CO_2H$.** — ⟨T. **4**.3a.⟩ — Thick pr. — **(Loses** all Br. v. easily w. alkalies.)
770	81–2	**Tribrom-m-cresol, $Br_3Me.C_6H.OH$.** — ⟨G.O.-D.⟩ — Ndl. fr. alc. — **Acetate:** ndl. fr. alc.; m.p. 68°.
775	81–2	**1,4-(β)-Dibromnaphthalene, $C_{10}H_6Br_2$.** — B.p. 310°. — Long ndl. — S. in 76 pt. (93.5%) alc. @ 11.4°.
780	81.5; 77	**3-Brombenzophenone, $BrC_6H_4.CO.Ph$.** — ⟨G.O.-E.⟩ — Ndl. — **Dist. undecd.**
785	83–4	**i-Phenylbromacetic Ac., $Ph,Br.CH{:}CO_2H$.** — ⟨T. **4**.3a.⟩ — **Monoclin. cryst.** fr. CS_2. — (Boiled w. NaOH **gives** mandelic Ac. (Vol. I).
790	83; 85	**3,5-Dibromsalicylic Ald., $Br_2.C_6H_2(OH)\ (CHO)$.** — ⟨G.O.-D.⟩ — **Yellowish** pr. — Sbl. in lft. & ndl. — I. aq.; e.s. eth., chlf. bz.
795	84	**1-Bromnaphthol-(2), $C_{10}H_6Br(OH)$.** — ⟨G.O.-D.⟩ — Lust. ndl. — **Nitroso** deriv.: m.p. 64–5° (Gazz. **12**, 431). — Oxidn. by alk. $KMnO_4$ **gives phthalic** ac. (T. **1**.318.)
800	85	**α-Dibromtoluquinone-(2,5), $MeC_6HBr_2O_2$.** — ⟨G.O.-A.⟩ — *Yel.* ndl. fr. dil. ac.ac.! — S. c. alc.
802	83–4; 92	**Dibrompyrocatechol-dimethyl-ether, Dibromveratrol, $Br_2.C_6H_2.(OMe)_2$.** — Pr. — I.aq.; e.s. alc., eth.
805	85–6	**α,β-Dibromacrylic Ac., $CHBr{:}CBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — **Cryst. — 100 pt.**

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
		aq. sol. @ 18° cont. 4.92 pt. — E.s. alc., eth., chlf.; d.s. bz. — (Boiled w. x.s. $Ba(OH)_2$ sol. gives bromacetylene, malonic ac. & CO_2).
810	85–6	**β,β-Dibromacrylic Ac., $CBr_2:CH.CO_2H$.** —⟨T. **4.**3a.⟩ — Sepd. fr. h. aq. sol. as oil slowly solidif. to pearly lft. — 100 pt. aq. sol. @ 20° cont. 3.335 pt.
815	85	**1,4,5-(β)-Tribromnaphthalene, $C_{10}H_5.Br_3$.** — Ndl. — E.s. alc.
820	86–7	**Benzoquinone Dibromide, $\ulcorner CO.CH:CH.CO.CHBr.CHBr \urcorner$.** — ⟨G.O.-A.⟩ — *S-yel.* ndl. fr. lgr.! — E.s. alc., eth., chlf., bz. — H_2O dec. to bromquinone. Zn dust + ac.ac. red. reasily to hydroquinone (Vol. I).
825	86.5	**1,4,6-7-(" β " deriv.)-Tetrabromnaphthalene, $C_{10}H_4.Br_4$.** — Ndl. fr. alc.
830	87	**α,β-Dibrombutyric Ac., "Crotonic Ac. Dibromide," $Me.CHBr.CHBr.CO_2H$.** — ⟨T. **4.**3a.⟩ — Ndl. fr. eth. — D.s. c. aq.; e.s. alc., eth., bz. — (Alc.- or aq.-KOH gives mixture of bromcrotonic acids.)
835	87.4	**1,2,3-Tribrombenzene, $C_6H_3Br_3$.** — ⟨G.O.-E.⟩ — Rhomb. tbl. fr. alc.
837	88	**2,3,6,7-Tetrabrom-2,6-dimethyloctane, $Me_2CBr.CHBr.CH_2.CH_2.CBrMe.CH$-$Br.Me$.** — ⟨G.O.-E.⟩ — Cryst. — S. alc. — Heated w. alk. gives Br.-free oil of peppermint odor.
840	88	**4,5-Dibrom-1,2-dimethylbenzene, $Br_2.C_6H_2.Me_2$.** — ⟨G.O.-E.⟩ — B.p. 278°. — Rhomb. lft. fr. alc. — V d.s. alc. @ 0°; v.s. h. alc.
845	88–9	**3,4,5-Tribromtoluene, $Br_3.C_6H_5Me$.** — ⟨G.O.-E.⟩
850	89–90	**β-Bromlactic Ac., $CH_2Br.CH(OH).CO_2H$.** — ⟨T. **4.**3.a⟩ — Pr. fr. eth. — S. in all proportions aq., eth.
855	89–90	**1,1,1,4,4,4-Hexabrombutanone-(2), $Br_3.CO.CH_2.CBr_3$.** — ⟨G.O.-E.⟩ — Cryst. fr. alc. — Alm. i. c. aq.; d.s. c. alc. — Fuming HNO_3 oxid. to malonic ac. (Vol. I).
865	89.3c; 87	**p-Dibrombenzene, $C_6H_4Br_2$.** — ⟨G.O.-E.⟩ — B.p. 219°. — Sp.gr. = 2.220. — Monoclin. pr. or lft. — (Chief dibrom. prod. fr. bz., Br. & I). — ⟨T. **4.**4a, negative.⟩
870	89	**p-Brombiphenyl, $Br.C_6H_4.Ph$.** — ⟨G.O.-E.⟩ — B.p. 310° (th.i.) — S.c. alc.; more s. gl. ac.ac.; c.s. eth., bz., CS_2. — Oxdn. gives p-brombenzoic ac. (No. **4.**1950).
875	88–90	**Tribromacenaphthene, $C_{12}H_7Br_3$.** — ⟨G.O.-A.⟩ — *Yel.* cryst.
877	91	**α-Brom-α,β-dimethylsuccinic Ac., $CO_2H.CBrMe.CHMe.CO_2H$.** — ⟨T. **4.**3a.⟩ — Ndl. fr. aq. — D.s. c. aq.; e.s. alc., eth.
885	91–2	**1,2,3,4-Tetrabromhexane, $Et.(CHBr)_3.CH_2Br$.** — ⟨G.O.-E.⟩ — Pr.
890	91.5–2.5	**2,4-Dibromresorcinol, $Br_2.C_6H_2(OH)_2$.** — ⟨G.O.-D.⟩ — Ndl. w. odor of bromphenol fr. aq. — Heated w. phthalic anhydr. + $ZnCl_2$ gives eosine.
895	92; 93	**α,α,β-Tribrompropionic Ac., $CH_2Br.CBr_2.CO_2H$.** — ⟨T. **4.**3a.⟩ — Cryst. fr. CS_2. — D.s. c. aq.; e.s. alc., eth., bz., CS_2. — (Heated w. 2 mol. alc.-KOH gives, α,β-dibromacrylic ac.)
900	92.5; 94	**Carbon Tetrabromide, CBr_4.** — ⟨G.O.-E.⟩ — B.p. 189.5°. — Lust. lft. — Odor ethereal! Taste sweetish. — Sbl. slowly at ord. temp. — Alc.-KOH dec. easily to K_2CO_3 & KBr!
910	92 d.	**α-Naphthoquinone Dibromide, $C_{10}H_6Br_2O_2$.** — ⟨G.O.-E.⟩ — Tbl. fr. bz. — E.s. alc. — (Gives brom-α-naphthoquinone easily.)
915	92–3	**$1^2,1^2$,4-Tribromacetophenone, $Br.C_6H_4.CO.CHBr_2$.** — ⟨G.O.-E.⟩ — Cryst. — E.s. h. alc., CS_2. — Oxdn. gives p-brombenzoic ac. (No. **4.**1950).
917	93–4	**Heptabromacetylacetone, $CBr_3.CO.CBr_2.CO.CHBr_2$.** — ⟨G.O.-E.⟩ — Pearly lft. fr. lgr. — I. NaOH sol. — Separates I fr. KI. — (Fr. phloroglucinol & Br.)
920	94.5	**$1^1,3^1,5^1$-Tribromtrimethylbenzene, $(CH_2Br)_3.C_6H_3$.** — ⟨G.O.-E.⟩ — Ndl.
925	94.9	**$1^1,2^1$-Dibrom-1,2-dimethylbenzene, $C_6H_4(CH_2Br)_2$.** — ⟨G.O.-E.⟩ — Dec. on distn. — Sp.gr. = 1.988 (0°). — S. in 6 pt. lgr.; more s. alc., chlf.: s. in 5 pt. eth. — Alk. $KMnO_4$ oxid. to phthalic ac. — (Boiled w. Na_2CO_3 sol. gives phthalyl alc.)

No.	Melting-point	" **ADDITIONAL ELEMENT** " — **BROMINE.** — SOLIDS.
927	95–6	**Tetrabromdiacetyl, $CHBr_2.CO.CO.CHBr_2$.** — ⟨G.O.-A.⟩ — **Large** *yel.* tbl. fr. CS_2.
930	96; 95	**2,4,6-Tribromphenol, "Bromol," $Br_3.C_6H_2.OH$.** — ⟨G.O.-D.⟩ — Hair-like ndl. fr. dil. alc.— Sbl. easily. — 1000 cc. aq. dis. 0.07 g. @ 15°. — V.s. alc. — (A bismuth salt, "Xeroform," has been used as intestinal antiseptic.) — Me Ether: ndl. fr. alc.; m.p. 87°. — Acetate: ndl. fr. alc.; m.p. 82°.
940	96–7	**Pentabrompropylbenzene, $Br_5.C_6.CH_2.CH_2.Me$.** — ⟨G.O.-E.⟩ — Ndl. — E.s. alc.
945	97; 100–100.5	**m-Brom-α-toluic Ac., $Br.C_6H_4.CH_2.CO_2H$.** — ⟨T. **3**.3b.⟩ — Asbestos-like ndl. fr. aq.
950	97	**Pentabromisopropylbenzene, $Br_5.C_6.CHMe_2$.** — ⟨G.O.-E.⟩ — Ndl. — D.s. c., e.s. h. alc.
955	97–7.5	**ω-Dibromcumene, $(CH_2Br)_2.C_6H_3.Me$.** — ⟨G.O.-E.⟩ — Silky ndl. fr. alc. — E. s. bz. — (Boiling w. Na_2CO_3 sol. replaces 2 Br by OH).
960	98	**α,β-Dibromlactic Ac., $CH_2Br.CBr(OH).CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. — E.s. aq.; i. CS_2.
965	98; 103	**Tribromorcinol, $Br_3.C_6Me(HO)_2$, (Me:HO:HO = 1:3:5).** — ⟨G.O.-D.⟩ — Ndl. fr. dil. alc. — I. aq.; e.s. alc., eth.
970	d. 98	**Phenanthrene Bromide, $C_{14}H_{10}Br_2$.** — ⟨G.O.-E.⟩ — Pr. fr. CS_2. — V. unstable. — Decd. by h. aq. in tube to HBr & bromphenanthrene, or by alc.-KOH to phenanthrene. — (Fr. Br & phenanthrene in CS_2.)
975	98.5	**1,3,4,5-Tetrabrombenzene, $C_6H_2Br_4$.** — ⟨G.O.-E.⟩ — B.p. 329°. — Ndl. — Alm. i. c. alc.; s. h. alc.; e.s. eth., bz., CS_2.
977	100	**(β)-$1^1,1^2$-Dibromcinnamic Ac., $Ph.CBr:CBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Yellowish trimet. pr. — I. aq.; e.s. alc., eth., chlf.; d.s. lgr. — E. decd. by alk.
978	100–1	**α-Bromsuberic Ac., $CO_2H.CHBr.(CH_2)_5.CO_2H$.** — ⟨T. **4**.3a.⟩ — Crusts fr. eth. — D.s. c. aq.; misc. aq. @ 60–70°; v.s. alc., eth.; e.s. chlf.; d.s. bz. — (Alc.-KOH removes Br.)
979	100	**Bromanthracene, $C_{14}H_9Br$.** — ⟨G.O.-A.⟩ — Long *yel.* ndl. — S. bz., CS_2, gl. ac. ac.; less s. alc. — Gives red comp. w. picric ac.
980	101	**α,β-Dibromisosuccinic Ac., $CH_2Br.CBr.(CO_2H)_2$.** — ⟨T. **4**.3a.⟩ — Cryst. fr. aq. — E.s. aq., alc., eth.
990	103–4	**o-Brom-α-toluic Ac., $Br.C_6H_4.CH_2.CO_2H$.** — ⟨T. **4**.3b.⟩ — Flat ndl. fr. gl.ac.ac. — E.s. alc., eth., CS_2; d.s. c. lgr. — CaA_2: ndl.; v.s. aq. — Oxidn. by $KMnO_4$ gives o-brombenzoic ac. (No. **4**.1400).
995	104–5	**5-Bromsalicylic Ald., $Br.C_6H_3.(OH)\ (CHO)$.** — Lft. fr. eth. — I. aq.; e.s. alc., eth. — (Unites w. $NaHSO_3$) — Phenylhydrazone: m.p. 145–6°.
1000	105	**Cumarin Bromide, ⌜$C_6H_4.CHBr.CHBr.CO.O$⌝.** — ⟨G.O.-E.⟩ — Oblique pr. fr. alc. — Loses Br. @ 120°. — E.s. alc.; s. eth., CS_2. — Boiling w. aq. gives cumarin. — (Alc.-KOH gives bromcumarin (pr., m.p. 110°) & cumarilic ac.)
1005	106	**4-Bromtoluquinone-(2,5), $MeC_6H_2BrO_2$.** — ⟨G.O.-A.⟩ — *Yel.* lft. fr. lgr.!
1010	106	**1,6-Dibromnaphthol-(2), $Br_2.C_{10}H_5.OH$.** — ⟨G.O.-D.⟩ — Ndl. fr. lgr.
1015	106	**$1^1,4^1,4^1$-Tribromxylene, $CH_2Br.C_6H_4.CHBr_2$.** — ⟨G.O.-E.⟩ — (Boiling w. aq. gives p-oxymethylbenzaldehyde.)
1025	105–8	**2,3,4,6-Tetrabromtoluene, $Br_4.C_6HMe$.** — ⟨G.O.-E.⟩
1027	107–8	**1,1,1,5,5,5-Hexabromacetylacetone, $Br_3.CO.CH_2.CO.Br_3$.** — ⟨G.O.-E.⟩ — Ndl. fr. abs. eth. — Decd. by alc. — (NaOH splits to tribromacetic ac. & tribromacetone.)
1030	108–9	**Hexabrom-2-methylpropane, $C_4H_4Br_6$.** — ⟨G.O.-E.⟩ — Cryst. fr. alc. or CS_2. — E.s. eth., CS_2; less s. h. alc.; d.s. c. alc.
1035	108.5–9	**1,8-Dibromnaphthalene, $C_{10}H_6.Br_2$.** — Scales fr. gl.ac.ac.
1040	109–9.5	**1^2,4-Dibromacetophenone, $Br.C_6H_4.CO.CH_2Br$.** — ⟨G.O.-E.⟩ — Ndl. — E.s. h. alc.
1045	109–10	**Tribromisosafrol, $Br_3.C_{10}H_9O_2$.** — Ndl. fr. lgr. — E.s. bz., chlf., h. lgr.

No.	Melting-point	"ADDITIONAL ELEMENT" — BROMINE. — SOLIDS.
1050	110–1	**Bromhydroquinone, $Br.C_6H_3(OH)_2$.** — ⟨G.O.D.⟩ — Silky lft. fr. lgr. — Sbl. — E.s. c. aq., alc., eth., bz.; s. lgr., chlf.
1055	110–1	**Perbromacetone, $(CBr_3)_2.CO$.** — ⟨G.O.-E.⟩ — Pr. fr. chlf. — I. aq.; e.s. eth., bz., chlf., CS_2. — Decd. by alc. — Boiled w. dil. NaOH gives chlf. & CO_2. — Na-amalgam gives isopropyl alc.
1060	110–1	**Dibromfurane-α-Tetrabromide, $C_4H_2Br_6O$.** — ⟨G.O.-E.⟩ — Pr. fr. alc. — E.s. alc., eth., chlf., CS_2. — (Boiling alc.-KOH gives HBr & tetrabromfurane.)
1065	110–10.5	**β-Stilbene Bromide, Ph.CHBr.CHBr.Ph.** — ⟨G.O.-E.⟩ — Cryst. fr. h. alc. — S. @ 18° in 25.2 pt. abs. alc., or 3.7 pt. eth. — @ 160° partly changes to α-isomer (much less sol), m.p. 237°.
1070	110–12	**3-Dibromresorcinol, $Br_2.C_6H_2.(OH)_2.H_2O$.** — ⟨G.O.-D.⟩ — Ndl. fr. aq. — R.d.s. aq.; e.s. alc., eth., h.aq. — Aq. sol. colored blue by $FeCl_3$!
1075	111	**Tribromresorcinol, $Br_3.C_6H.(OH)_2.xH_2O$.** — ⟨G.O.-D.⟩ — Sm. ndl. — D. s. c. aq.; e.s. alc.
1080	111; 105.5	**2,4-Dibromnaphthol-(1), $Br_2.C_{10}H_5.OH$.** — ⟨G.O.-D.⟩ — Long ndl. fr. alc. — Boils w. decn. — I. aq.; e.s. alc., eth. — Alc.-KOH gives dioxynaphthol easily. — Alk.-$KMnO_4$ oxid. to phthalic ac.
1085	111 d.	**Naphthalene Tetrabromide, $C_{10}H_8.Br_4$.** — ⟨G.O.-E.⟩ — Monoclin. pr. — I. aq., c. alc.; d.s. h. alc. — Heated evolves HBr. & Br., giving 1,4-dibromnaphthalene & α-bromnaphthalene. — Boiled w. alc.-KOH gives α-bromnaphthalene. — Oxdn. by HNO_3 gives phthalic ac. (T. **1**.905).
1090	111–11.5	**2,3,4,5-Tetrabromtoluene, $Br_4.C_6HMe$.** — ⟨G.O.-E.⟩ — Thin ndl.
1095	111.2–2.8	**2,4,5-Tribromtoluene, $Br_3C_6H_2Me$.** — ⟨G.O.-E.⟩ — Ndl. fr. alc.
1100	112d; abt. 113d.	**Brommalonic Ac., $CHBr.(CO_2H)_2$.** — ⟨T. **4**.3a.⟩ — Deliq. ndl. fr. eth. — E.s. alc., eth.
1105	112	**2,2-Dibromdesoxybenzoin, $Ph.CO.CBr_2.Ph$.** — ⟨T. **4**.5.⟩ — E.s. eth., h. alc.; s. 8 pt. boiling alc. (85%). — Alc.-$AgNO_3$ ppts. all Br, giving benzil.
1110	112	**1-Bromacenaphthenone, ⌜$C_{10}H_6.CHBr.CO$⌝.** — ⟨G.O.-E.⟩ — Cryst. fr. lgr. — (Warmed w. dil. NaOH sol. loses all Br.)
1115	112.5	**3,6-Dibrom-1,2,4,5-tetraethylbenzene, $Br_2.C_6Et_4$.** — ⟨G.O.-E.⟩ — B.p. 325–330°. — Cryst. fr. alc. — V.d.s. c. alc.
1120	113.4; 114–5	**9,10,12,13-Tetrabromoctadecanoic-(1) Ac., Linoleic Ac. Tetrabromide, Me.-$(CH_2)_4.CHBr.CHBr.CH_2.CHBr.CHBr.(CH_2)_7.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Lft. fr. gl.ac.ac. — I. aq.; e.s. alc., eth., chlf., gl.ac.ac., bz.
1125	113.5	**Pentabromresorcinol, $C_6HBr_5O_2$.** — ⟨T. **4**.3a.⟩ — Tetrag. cryst. fr. CS_2. — Alm. i. aq.; e.s. alc., eth. – (Alc. sol. gives AgBr ppt. w. $AgNO_3$ sol.) — Boiled w. dil. KOH sol. gives bromoform.
1130	113–4	**1,2,4-Tribromnaphthalene, $C_{10}H_5.Br_3$.** — Ndl. — E.s. eth., chlf., bz., CS_2; less s. alc. — (Oxid. to phthalic ac. by dil. HNO_3 @ 180°.)
1135	114–5	**β,β-Dibromlevulinic Ac., $Me.CO.CBr_2.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. fr. eth. & lgr. — D.s. c. aq., chlf., bz.; e.s. alc., eth.; alm. i. CS_2. — (Decd. by boiling w. aq., giving some diacetyl, etc.)
1137	114–5; 117–8	**Dibrommaleic Ac, Anhydr., ⌜CO.CBr:CBr.CO.O⌝.** — Sbl. in ndl. — E.s. alc., eth.
1140	114	**p-Brom-α-toluic Ac., $Br.C_6H_4.CH_2.CO_2H$.** — ⟨T. **4**.3b.⟩ — Long ndl. — Sbl. in small tbl. — D.s.c. aq.; more s. h.; v.s. alc., eth., CS_2. — Ag$\bar{A}$: curdy ppt.; blackens at 60°.
1145	114.5	**1,2,3,4-Tetrabrompentane, $CH_2Br.(CHBr)_3.Me$.** — ⟨G.O.-E.⟩ — Lft. or pr. fr. alc.
1150	115	**4,6-Dibromtoluquinone-(2,5), $Me.C_6HBr_2O_2$.** — ⟨G.O.-A.⟩ — *Golden* cryst.! — Sbl. fr. 80°. — E.s. alc., eth., chlf.
1155	115–6	**β-Bromacrylic Ac., $CHBr{:}CH.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. fr. eth. — W. fuming HBr @ 100° gives β,β-dibrompropionic ac.
1160	115.5–6	**α,α,β-Tribrombutyric Ac., $Me.CHBr.CBr_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Pr. fr. eth.

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
		— D.s. c. aq.; e.s. alc., eth., CS_2. — Na salt warmed in aq. sol. dec. to CO_2 & 1,1-dibrompropene-(1). — (Alc.-KOH gives α,β-dibromcrotonic ac.)
1165	115	**Dibromditolylmethane, $C_{15}H_{14}Br_2$.** — Ndl. fr. alc. — V.s. alc., eth. — *Not* at. by h. alc.-KOH.
1167	115–6	**Tribromguiacol, $Br_3.C_6H.(OH)\ (OMe)$,(HO:MeO-1:2).** — ⟨G.O.-D.⟩ — Silky ndl. fr. aq. — D.s. h. aq.; e.s. alc., eth., bz., lgr.
1170	115–17	**$1^1,1^1,2^1,2^1$-Tetrabromdimethylbenzene, $C_6H_2(CH_2Br)_4$.** — ⟨G.O.-E.⟩ — Cryst. fr. abs. alc. — R.d. s. alc.; e.s. chlf.; i. lgr.
1175	116–7	**2,3,5,6-Tetrabromtoluene, Br_4C_6HMe.** — ⟨G.O.-E.⟩ — Ndl. — D.s. alc.
1180	118	**α,β,β-Tribrompropionic Ac., $CHBr_2.CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Lft. — E.s. h. aq.; v.s. alc., eth. — (Baryta aq. gives α,β-dibromacrylic ac.)
1185	117; 118	**Tribromacrylic Ac., $CBr_2:CBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. — E.s. alc., eth. 100 pt. aq. sol. @ 20° cont. 1.35 pt. — (H. alc.-KOH attacks only slightly.) — $Ba\bar{A}_2.5H_2O$ w. aq. @ 120° gives CO_2 & tribromethylene.
1190	116; 118–19 117; 118	**α-1,2,3,4-Tetrabrombutane, $CH_2Br.(CHBr)_2.CH_2Br$.** — ⟨G.O.-E.⟩ — B.p. 260–70° d. & partly changes to β-isomer of m.p. 38°. — Monoclin. ndl. fr. alc. — S. in 20 pt. boiling alc.; i. lgr.; e. vol. w. st. — Alc.-KOH gives $C_4H_4Br_2$. — H. alc. w. Zn dust gives butadiene-(1,3). — (Higher melting comp. fr. Br. & butadiene(1,3).).
1195	118	**1,2,6-Tribromnaphthalene, $C_{10}H_5.Br_3$.** — Ndl. fr. alc. — E.s. alc., eth., lgr.
1200	118–9	**Dibromeugenol Bromide, $MeO.C_6HBr_2(C_3H_5Br_2).OH$.** — ⟨G.O.-D.⟩ — Lust. tbl. fr. alc. — D.s. alc., eth. — (Zn dust gives dibromeugenol, m.p. 59°).
1205	118–20	**α,β,β,β-Tetrabrompropionic Ac., $CBr_3.CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Pr. fr. CS_2. — Somewhat s. h. aq. — $Ba\bar{A}_2.1/2H_2O$: pr.; v.s. aq.; warmed w. aq. dec. to tribromethylene, CO_2, & $BaBr_2$.
1210	119.6	**1,3,5-Tribrombenzene, $C_6H_3Br_3$.** — ⟨G.O.-E.⟩ — B.p. 278°. — Ndl. — D.s. h. alc.
1212	120	**(Allo-)-α-Bromcinnamic Ac., $Ph.C_6H_4.CH:CBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. fr. h. aq. — E.s. h. aq.; v.s. alc., CS_2, bz. — Distn. gives stereoisomer of m.p. 131°. — Ba salt deliq. (Unlike stereoisomer.)
1215	120	**2,3,4,6-Tetrabromphenol, $Br_4.C_6H.OH$.** — ⟨G.O.-D.⟩ — Ndl. fr. alc. — V.s. alc. — Sbl.
1220	121	**2,3,4,6-Tetrabromphenol Bromide, $Br_5C_6H.O$.** — ⟨G.O.-A.⟩ — *Yel.* monoclin. plates fr. chlf. — Boiling w. alc. gives tetrabromphenol.
1225	121–3	**Acenaphthylene Dibromide, $C_{10}H_6.(CHBr)_2$.** — ⟨G.O.-E.⟩ — Ndl. — (Decd. even by boiling w. alc. w. loss HBr.) — Solid NaOEt gives acenaphthylene.
1230	123 u.c.	**Xanthogallol, $\ulcorner CO.CBr_2.CBr:CBr.CO \urcorner$.** — ⟨G.O.-A.⟩ — OY. lft. fr. h. lgr.! — Sbl. @ 130° w. sl. decn. — E.s. eth., CS_2, bz.; less s. lgr. — Decd. by h. aq. or alc. — Liberates I fr. aq.-KI sol. on warming! — Cryst. undecd. fr. conc. HNO_3. — Aniline deriv.; (Ann. **245**, 336) greenish yel. pr. fr. alc.; m.p. abt. 195° u.c., darkening fr. 190°; d.s. alc. — (Fr. pyrogallol & Br).
1232	123.5	**Dibrommaleic Ac., $CO_2H.CBr:CBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Ndl. fr. eth. — V.s. aq.; s. alc., eth.; i. bz., chlf., CS_2. — Distd. in current CO_2 gives anhydride: m.p. 114–5°, 117–8°; e.s. eth.
1235	124	**3-Brom-4-hydroxybenzaldehyde, $Br(HO).C_6H_3.CHO$.** — ⟨T. **4**.3a.⟩ — Lft. fr. aq. — V.s. alc., eth. — $Na\bar{A}$: ndl.; d.s. alc. — $Ag\bar{A}$: yel. ndl.
1240	125	**α-Brom-β-phenyl-β-hydroxypropionic Ac., $Ph.CH(OH).CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. w. 1 H_2O; m.p. 120–2° (losing aq.); effloresces in air. — E.s. h. aq., chlf. — (Loses HBr w. h. Na_2CO_3 sol.). — (d-Acid: cryst. fr. chlf.; m.p. 119–20°.
1245	125.5–6	**α,α,β,β-Tetrabrompropionic Ac., $CHBr_2.CBr_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Tbl. fr. lgr. — Pr. fr. chlf. — D.s. lgr.; e.s. h. chlf., bz., CS_2, eth., alc. — $Ba\bar{A}_2$.-$2H_2O$: boiled w. aq. gives tribromethylene, $BaBr_2$ & CO_2.
1250	125	**6,6,7,7-Tetrabromoctadecanoic Ac.-(1), $Me.(CH_2)_{10}.CBr_2.CBr_2.(CH_2)_4.CO_2H$.** — ⟨T. **4**.3a. in alc.⟩
1255	126	**Pentabromorcinol, $C_7H_3O_2Br_5$.** — ⟨G.O.-A.⟩ — *Pale yel.* cryst. — E.s. alc., eth.; s. CS_2, bz. — At 160° loses Br_2.

No.	Melting-point	"ADDITIONAL ELEMENT" — BROMINE. — SOLIDS.
1260	127–8	**4-Bromnaphthol-(1), $Br.C_{10}H_6.OH$.** — ⟨G.O.-D.⟩ — W. Br. & gl.ac.ac. gives 2,4-dibromnaphthol-(1).Picrate: — m. p. 167°. — Acetate: m.p. 51°.
1265	127	**6-Bromnaphthol-(2), $Br.C_{10}H_6.OH$.** — ⟨G.O.-D.⟩ — Ndl. — Acetate: m.p. 103°.
1270	128	**Hexabromphenol, Pentabromphenol Bromide, Br_6C_6O.** — ⟨G.O.-A.⟩ — *Yel.* cryst. gran. fr. chlf. — I.c. alc. — Boiling w. alc. gives pentabromphenol, m.p. 225°.
1275	128–9	**(Para)-α-Bromisobutyric Ald., $(Me_2CBr.CHO)_3$.** — Lust. ndl. fr. alc. — Sbl. on continuous heating. — I. aq., ac., alk., even h.; v.s. eth.; s. abs. alc. — (Does not red. ammon. $AgNO_3$ sol.)
1280	129	**Brompiperonal, $(CH_2O_2).C_6H_2Br.CHO$.** — ⟨G.O.-E.⟩ — Ndl. fr. alc. — Tbl. fr. bz. — I. c. aq.; e.s. h. alc., bz.; d.s. c. alc. — E. vol. w. st.
1285	130	**2-Brom-α-Naphthoquinone, $C_{10}H_5BrO_2$.** — ⟨G.O.-A.⟩ — *Yel.* ndl. fr. alc.! — E.s. chlf., gl.ac.ac.; less s. bz., eth.
1290	131	**2,6-Dibrombenzoquinone, $C_6H_2Br_2O_2$.** — ⟨G.O.-A.⟩ — Large *gold-yel.* lft. fr. alc.! — V.s. alc., eth., chlf., bz. — Sbl. fr. 100° w. sl. decn.
1292	130–1	**α-Bromcinnamic Ac., $Ph.CH{:}CBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Dist. w. sl. decn. — Long 4-sided ndl. fr. aq. — V.s. alc.; less s. eth.
1293	131	**α-Bromadipic Ac., $CO_2H.CHBr.(CH_2)_3.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Cryst. fr. alc. — Partly decd. by aq. — Boiled w. aq. gives α-hydroxyadipic ac.
1295	131 d.	**Tribromphenol Bromide, $Br_4C_6H_2O$.** — ⟨G.O.-A.⟩ — *Yel.* lft.! Gives off Br in melting or boiling w. alc. — I. aq. — Convert into 2,4,6-tribromphenol, m.p. 92.5–93.5° by treatment. w sodium sulphite sol. (Cf. T. 414–(3), Vol. I).
1300	131; 135	**Tribromacetic Ac., $Br_3C.CO_2H$.** — ⟨T. **4**.3a.⟩ — Monoclin. tbl. — E.s. aq. — Salts: e.s. aq., decg. in sol. on warming to $CHBr_3$ & NaBr. Aq. or alc. sol. of acid undergoes similar decomp. on heating. — Esters liq. — Ag$\bar{A}$: leafy cryst.; v. unstable.
1305	130–1.5	**1,5-(γ)-Dibromnaphthalene, $C_{10}H_6Br_2$.** — B.p. 325–6°. — Lust. tbl. — S. in 50 pt. 93.5% alc. @ 56°. — E.s. eth.; d.s. gl.ac.ac.
1307	133–4; 134–5	**β-Bromcinnamic Ac., $Ph.CBr{:}CH.CO_2H$.** — ⟨T. **4**.4a.⟩ — Ndl. fr. aq. Thick rhomb. pr. fr. chlf. — E.s. alc., h. bz.; d.s. CS_2, h. lgr. — Ba$\bar{A}_2$: lft.; 100 pt. aq. @ 0° dis. 0.776 pt.
1310	abt. 135	**3,6-Dibromphthalic Ac., $Br_2.C_6H_2.(CO_2H)_2$.** — Cryst. powd. — Loses aq. at m.p. giving anhydride, m.p. 208°, wh. is s. alc., d.s. eth.
1315	135	**Bromorcinol, $Me,(HO)_2.C_6H_2Br,(Me{:}(HO)_2 = 1{:}3.5)$.** — ⟨G.O.-D.⟩ — Cryst. — Mod. s. h. aq.; v.s. alc., eth.
1320	136	**Tribromsuccinic Ac., $CO_2H.CHBr.CBr_2.CO_2H$.** — ⟨T **4**.3a.⟩ — Tbl. fr. eth. + bz. — E.s. aq., alc., eth.; less s. bz.; v.d.s. lgr., CS_2. — (Short boiling w. aq. dec. to HBr, CO_2 & β,β-dibromacrylic ac.)
1325	136	**Tribromhydroquinone, $Br_3.C_6H.(OH)_2$.** — Silky ndl. — E.s. h. aq.; v.d. s. c. aq.; e.s. alc., eth., chlf., bz. — $FeCl_3$ oxid. to tribromquinone.
1330	130–1 d.; 147 d.	**Dibrommalonic Ac., $CBr_2.(CO_2H)_2$.** — ⟨T. **4**.3a.⟩ — Cryst. — E.s. aq., alc., eth.; d.s. bz., pet.-eth. — (Warmed w. aq. splits easily to CO_2 & dibromacetic ac.)
1335	137 (aq free)	**β-Bromglutaric Ac., $CHBr.(CH_2.CO_2H)_2$.** — ⟨T. **4**.3a.⟩ — Boiled w. 1/2 mol. Na_2CO_3 sol. gives β-oxyglutaric & vinylacetic ac.
1337	137	**Itabrompyrotartaric Ac., $CH_2Br.CH(CO_2H).CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Monoclin. cryst. — E.s. h. aq. — (Boiled w. x.s. Na_2CO_3 sol. quickly dec. to HBr, itaconic & itamalic acids.)
1340	136–8 (sl.h.); 140–1 (r.h.)	**Brommaleic Ac., $CO_2H.CH{:}CBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Ndl. or pr. — V.s. aq., alc., eth. — Distn. gives aq. & brommaleic anhydr.
1342	139	**(α)-$1^1,1^2$-Dibromcinnamic Ac., $Ph.CBr{:}CBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Tbl. fr. chlf. + lgr. — I. aq.; e.s. alc., eth., chlf.; d.s. lgr. — (E. decd. by alk.)
1345	139 d.	**Dibromgallic Ac., $(HO)_3.C_6Br_2.CO_2H.H_2O$.** — ⟨T. **4**.3a.⟩ — Loses cryst. aq. @ 120°. — 100 pt. aq. @ 15° dis. 12.4 pt. — V.s. h. aq. — $FeCl_3$ gives blue-black color!

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
1347	140	**3-Bromtoluic Ac., $Br.C_6H_3.Me(CO_2H),(CH_3 = 1)$.** — ⟨T. 4.3b.⟩ — Ndl. — V.d.s. aq. — Chloride: ndl. fr. chlf.; m.p. 120°. — Amide: Sbl. in ndl.; m.p. 137°.
1348	139–140; 137–8; 140	**1,2,3,4-Tetrabrom-2,3-dimethylbutane, $Me.CBr(CH_2Br).CBr(CH_2Br).Me$.** — ⟨G.O.-E.⟩ — Cryst. fr. eth., bz., or gl. ac. ac. — D.s. alc.
1350	140–1	**1,1,2,2,5,5,6,6-Octobromhexane, Dipropargyl Octobromide, $CHBr_2.CBr_2.(CH_2)_2.CBr_2.CHBr_2$.** — ⟨G.O.-E.⟩ — Triclin. cryst. fr. CS_2.
1355	140.5	**2,7-(δ)-Dibromnaphthalene, $C_{10}H_6.Br_2$.** — Thin tbl.
1360	141–3	**β,β,β-Tribromlactic Ac., $CBr_3.CH(OH).CO_2H$.** — ⟨T. 4.3a.⟩ — Cryst. — V.s. aq.
1365	140–2	**α,α^1-Dibrompimelic Ac., $CO_2H.CHBr.(CH_2)_3.CHBr.CO_2H$.** — ⟨T. 4.3a.⟩ — Pr. fr. eth. + lgr. — V.s. alc., eth.; r.d.s. chlf.; d.s. bz.; alm. i. lgr. — (NaOEt gives cyclopentenedicarbonic ac.).
1370	141	**3,3¹-Dibrombenzophenone, $(C_6H_4Br)_2CO$.** — ⟨G.O.-E.⟩ — Broad lust. ndl. fr. alc. — Mod. s. alc.
1373	142–3 d.	**rac.-α,α^1-Dibromglutaric Ac., $CO_2H.CHBr.CH_2.CHBr.CO_2H$.** — ⟨T. 4.3a.⟩ — Cryst. — E.s. aq., alc., eth.; v.d.s. bz. — ($AgNO_3$ in sol. acidified w. HNO_3 ppts. AgBr after some min.)
1375	143	**Dulcitoldibromhydrine, $C_6H_8O(OH)_3Br$.** — ⟨G.O.-E.⟩ — Ndl. — Misc. aq., alc., eth. — (Decd. by aq. @ 100° to HBr & dulcitan.).
1380	143.5	**1¹,4¹-Dibromxylene, $(CH_2Br)_2.C_6H_4$.** — ⟨G.O.-E.⟩ — B.p. 240–50°. — Sp.gr. = 2.012 @ 0°. — 100 pt. eth. dis. 2.65 pt. @ 20°. — E.s. chlf.
1385	146.5	**2,6-Dibrombenzoic Ac., $Br_2.C_6H_3.CO_2H$.** — ⟨T. 4.3 & 4.10.⟩ — Ndl. — E. vol. w. st. — V.s. alc., eth., chlf. — $Ba\bar{A}_2.3Aq$: ndl.; e.s. aq. — $Me\bar{A}$: m.p. 78°. — Chloride: m.p. 46°. — Amide: ndl. fr. aq.; m.p. 192°.
1390	146–7; 145–7	**2,4,6-Tribrom-3-hydroxybenzoic Ac., $Br_3(HO).C_6H.CO_2H$.** — ⟨T. 4.3.⟩ — Ndl. fr. aq. — Cryst. w. 1/2 H_2O. — S. alc., eth. — $Me\bar{A}$: cryst. fr. lgr.; m.p. 119–21°. — Amide: m.p. 221°.
1392	146–7	**4-Brommesitylenic Ac., $Br.C_6H_2Me_2.CO_2H$.** — ⟨T. 4.3b.⟩ — Rhomb. pr. fr. alc. Ndl. fr. aq. — E.s. h. aq., alc.; v.d.s. c. aq. — $Ba\bar{A}_2.4H_2O$: monoclin. cryst.; mod.s. aq.
1395	147	**Tribrombenzoquinone, $C_6HBr_3O_2$.** — ⟨G.O.-E.⟩ — Lust. *gold-yel.* lft. fr. alc.! — Sbl. in fern-like cryst. — E.s. alc., eth., chlf., bz., gl.ac.ac. — Alk. changes to green & dis. w. brown color! — (Boiled w. conc. NaOH gives tribromhydroquinone & bromanilic ac.).
1400	147–8; 148; 150	**o-Brombenzoic Ac., $Br.C_6H_4.CO_2H$.** — ⟨T. 4.3b. & 4.10.⟩ — Ndl. — S. h. aq.; e.s. alc., eth., chlf. — Slow. vol. w. st. — $Ba\bar{A}_2$: v. s. aq. — $Me\bar{A}$: b.p. 241–3°. — Amide: m.p. 155–6°; d.s. eth. — Anilide: m.p. 142.5°.
1405	147	**2,3-Dibrombenzoic Ac., $Br_2.C_6H_3.CO_2H$.** — ⟨T. 4.3b.⟩ — Silky ndl. fr. aq.— $Ba\bar{A}_2.4$ aq: warty ndl. — (100 pt. of aq. sol. (16°) contains 4.2225 pt. anhydr. salt).
1407	148; 149	**Citrabrompyrotartaric Ac., $Me.CBr(CO_2H).CH_2.CO_2H$.** — ⟨T. 4.3a.⟩ — Monoclin. cryst. — Boiled w. x.s. Na_2CO_3 sol. gives methacrylic. ac., HBr & CO_2.
1410	148	**3-Brom-4-hydroxybenzoic Ac., $Br.C_6H_3.(OH)(CO_2H)$.** — ⟨T. 4.3a & 4.10.⟩ — Ndl. fr. c. ethyl acet. + 3–4 vol. h. lgr. — $Me\bar{A}$: m.p. 107°; d.s. lgr.; e.s. alc.
1412	147 d.	**β-Bromadipic Ac., $CO_2H.CH_2.CHBr.(CH_2)_2.CO_2H$.** — ⟨T. 4.3a.⟩ — Pr. fr. aq. — E.s. alc., h. aq.; d.s. eth.; v.d.s. bz.
1415	150–1	**Tetrabrom-o-quinone, $C_6Br_4O_2$.** — ⟨G.O.-A.⟩ — *Garnet-red* pr. & tbl., or dark red lft. w. met. lust.! — E.s. alc., eth., bz.; d.s. lgr. — W. dimethylaniline in ac.ac. sol. gives blue dyestuff! — Liberates Br fr. HBr. — W. aniline in ac.ac. sol. gives anilide: m.p. 172°–3°; crystg. in black ndl.
1420	abt. 150 d.	**6-Bromnaphthoquinone-(1,2), $C_{10}H_5BrO_2$.** — ⟨G.O.-A.⟩ — *Yel.* ndl. fr. aq.!
1422	150; 143 d.	**2-Brom-2,2,3-trimethylbutane, $BrMe_2C.CMe_3$.** — ⟨G.O.-E.⟩ — Powd. w. camphorous odor! — E.s. eth.; less s. alc.

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
1425	149.5; 151.5	**α-Dibromnaphthoquinone, $C_{10}H_4Br_2O_2$.** — Granules fr. alc. — Sbl. w. sl. decn. — S. in 102 pt. alc. (98%) @ 13°; d.s. eth., bz.; e.s. h. alc.
1430	149–51; 152–3	**Tribromphloroglucinol, $Br_3.C_6(OH)_3.3H_2O$.** — ⟨G.O.-D.⟩ — Cryst. — Red. to phloroglucinol by Sn + HCl.
1435	152–3	**4-Brom-m-toluic Ac., $Br.C_6H_3.Me,CO_2H$.** — ⟨T. **4**.3b.⟩ — Fine ndl. — D.s. c. gl. ac. ac. — Oxidn. gives 4-bromisophthalic Ac. — $Ba\bar{A}_2.4H_2O$: r.d. s. ndl.
1440	152	**Triphenylbrommethane, $Ph_3.CBr$.** — ⟨G.O.-E.⟩ — *Yel.* cryst. fr. CS_2. — Begins to evolve HBr @ 200°. — Sl. decd. by boiling with aq. or alk. — W. 4 Br. in chlf. gives scarlet cubes of tetrabromide losing Br. in air. — W. I_4 in bz. gives blue-green hexag. pr. of unstable tetraiodide. (M.p. 152°.)
1444	153; (140)	**α^1-Brom-α,α-dimethylsuccinic Ac., $CO_2H.CMe_2.CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. — E.s. aq., alc., eth.; d.s. chlf.; i. pet.-eth. — Boiled w. baryta aq. gives dimethylmalic ac.
1445	153	**2,5-Dibrombenzoic Ac., $Br_2.C_6H_3.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. h. aq. — R.d.s. c. aq.; v.e.s. alc., eth.
1450	153	**Hexabromnaphthol-(1), $Br_6.C_{10}H_3.OH$.** — ⟨G.O.-D.⟩ — V. unstable. — Loses HBr in melting.
1452	154–5	**Octobromacetylacetone, Phlorobromin, $CBr_3.CO.CBr_2.CO.CBr_3$.** — ⟨G.O.-E.⟩ — Thick ndl. fr. chlf. — I. aq.; d.s. CS_2, lgr.; more s. eth., chlf., bz. — Separates I fr. KI! — Sol. in h. alc. gives pentabromacetone. — (**Fr.** phloroglucinol & Br.)
1455	155	**m-Brombenzoic Ac., $Br.C_6H_4.CO_2H$.** — ⟨T. **4**.b. & **4**.10.⟩ — Dist. undecd. a. 280°. — Ndl. — D. vol. w. st. — D.s. aq.; e.s. alc., eth. — $Me\bar{A}$: m.p. 31–2°. — Chloride: b.p. 239°. — Amide: lft. fr. dil. alc.; m.p. 150°. — Anilide: scales fr. alc.; m.p. 146°.
1457	155	**Dibromisophthalic Ac., $Br_2.C_6H_2.(CO_2H)_2$.** — ⟨T. **4**.3.⟩ — Ndl. — Sbl. — D.s. c. aq.; more s. alc. — $Ag\bar{A}$: ppt.
1460	154–6	**1,2¹,2¹,3-Tetrabrom-2,2-dimethylpropane, $CH_2Br.C(CH_2Br)_2.CH_2Br$.** — ⟨G.-O.-E.⟩ — Lft. — D.s. eth.; i. gl.ac.ac.; s. h. alc.
1465	158	**2,6-(ε)Dibromnaphthalene, $C_{10}H_6.Br_2$.** — Tbl. fr. eth. + chlf. — E.s. eth., chlf., lgr.
1467	159–60	**(Allo-)-β-Bromcinnamic Ac., $Ph.C_6H_4.CBr{:}CH.CO_2H$.** — ⟨T. **4**.3a.⟩ — Lft. fr. h. aq. — E.s. alc., eth., chlf., h. bz.; d.s. h. lgr. — Decd. by boiling w. Na_2CO_3 sol. to phenylacetylene, etc. — Heated for 3 hr. @ 164° gives stereomer; m.p. 134°.
1470	159; 160–1	**d,l-Bromsuccinic Ac., $CO_2H.CHBr.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. — S. in 5.2 pt. aq. @ 15.5°. — Heated above m.p. gives fumaric ac. — (Esters liq. — Alkali e. removes HBr.)
1475	159–60 d.	**Pyromucic Ac. Tetrabromide, $\ulcorner CHBr.CHBr.CHBr.O.CBr(CO_2H)\urcorner$.** — ⟨T. **4**.3a.⟩ — Cryst. fr. lgr. or dry eth. — I. c. aq. (Decd. by h. aq. w. evol. CO_2 & HBr!) E.s. alc., eth.; d.s. chlf., lgr. — Oxid. by dil. CrO_3 to dibromsuccinic ac. — (Reductn. gives pyromucic ac.)
1480	160	**α,β,γ,δ-Tetrabromvalerianic Ac., $CH_2Br.(CHBr)_3.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. fr. bz. — E.s. alc., eth., CS_2, h. bz., aq. — (C. alk. removes Br.)
1485	160–1	**Bromvanillin, $MeO.C_6H_2.Br(OH).CHO$.** — ⟨G.O.-A.⟩ — Yellowish lft. — Odorless. — V.d.s. c. aq.
1490	160	**Bromsalicin, $C_{13}H_{17}O_7Br$.** — Cryst. in silky 4-sided pr. w. $2H_2O$ (lost @ 110°). — E.s. aq., alc.; i. abs. eth.
1495	159–60	**Pentabrombenzene, C_6HBr_5.** — ⟨G.O.-E.⟩ — Ndl. fr. gl.ac.ac. or much alc. — V.d. vol. w. st. — D.s. alc., eth., gl.ac.ac., lgr.; s. bz., chlf. — (Boiling w. alc. NaOEt removes 40% of Br.)
1500	161–2	**1²-Bromdiphenacyl, $Ph.CO.CHBr.CH_2.CO.Ph$.** — ⟨G.O.-E.⟩ — Lust. ndl. fr. warm eth. — S. in abt. 5 pt. abs. alc. @ 20° or 25 pt. boiling alc. — Boiled w. alc. & Zn dust gives acetophenone & diphenacyl.
1505	161–2 d.	**Tetrabromacenaphthene, $C_{12}H_6Br_4$.** — Cryst. — I. alc.
1510	164	**Tetrabromnaphthoquinone-(1,4), $Br_4C_{10}H_2O_2$.** — ⟨G.O.-A.⟩ — *Cinnabar-red*

No.	Melting-point	"ADDITIONAL ELEMENT" — BROMINE. — SOLIDS.
		cryst. gran.— D.s. warm alc., eth.; s. h. gl.ac.ac. or chlf.; e.s. h. bz.; i. lgr. — Sol. (w. decn.) in warm KOH sol.
1515	164–5	**5-Bromsalicylic Ac.-(1), $Br(HO).C_6H_3.CO_2H$.** — ⟨T. **4**.3a & **4**.10.⟩ — Ndl. fr. h. aq. — $FeCl_3$ gives violet color! — $B\bar{A}_2.3H_2O$: ndl. — $Me\bar{A}$: m.p. 61°. — Amide: lft.; m.p. 232°.
1520	163–4	**2,6-Dibromhydroquinone, $Br_2.C_6H_2(OH)_2$. — Lft.**
1525	164	**p-Dibrombiphenyl, $(Br.C_6H_4.)_2$.** — ⟨G.O.-E.⟩ — **B.p. 355–360°. — Monoclin.** pr. fr. bz. — I. c. alc.; d.s. h. alc.; e.s. bz.
1530	166–7	**(High melting "Allo") s-Dibromsuccinic Ac., $CO_2H.(CHBr)_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Cryst. fr. aq. — Boiled w. 4 mol. $\bar{N}$-NaOH sol. gives HBr & acetylenedicarbonic ac. — ($Me_2\bar{A}$ & $Et_2\bar{A}$, oils.) — At 180° dec. to HBr & bromfumaric ac.)
1535	166.5	**2,4-Dibrombenzoic Ac.: $Br_2.C_6H_3.CO_2H$.** — ⟨T. **4**.3a & **4**.10.⟩ — Ndl. or tbl. — E. vol. w. st. — $Ba\bar{A}_2$.3 or 4 Aq.; ndl.; e.s. aq. — $Me\bar{A}$: m.p. 33°; ndl. fr. chlf. — Chloride: m.p. 48–9°. — Amide: ndl. fr. dil. alc.; m.p. 195°.
1540	165.5–6	**3-Brom-2-nitrocinnamylmethylketone, $Br(NO_2).C_6H_3.CH:CH.CO.Me$.** — *Yellowish* ndl. fr. dil. ac.ac. — D.s. alc., eth., bz. — Warming w. dil. NaOH gives m-dibromindigo!
1545	167	**3,5-Dibrompyromucic Ac., $\ulcorner:CBr.CH:CBr.O.C(CO_2H)\urcorner$.** — ⟨T. **4**.3a.⟩ — Oblique pr. fr. aq. — 100 pt. aq. sol. @ 20° cont. 0.28 pt. ac. — E.s. alc., eth.; s. bz., chlf.; v.d.s. lgr., CS_2. — $Ba\bar{A}_2.4H_2O$: ndl.; 100 pt. aq. sol. @ 16° cont. 0.10 pt. dry salt. — $Et\bar{A}$: pr. fr. alc.; m.p. 57–58°; b.p. 271–2°.
1550	165–70 d.	**α-Bromisosuccinic Ac., $Me.CBr.(CO_2H)_2$.** — ⟨T. **4**.3a.⟩ — Octahedra fr. eth. + pet. eth. — Fusion splits to CO_2 & α-brompropionic ac.!
1555	167	**4-Brom-o-toluic Ac., $Me,Br.C_6H_3.CO_2H$, ($Me:Br:CO_2H = 1:4:2$),** — ⟨T. **4**.3b.⟩ — Long ndl. fr. h. aq. — E. vol. w. st. — Alm. i. c. aq.; d.s. h. aq.; v.s. alc., eth. — $Me\bar{A}$: lft. fr. alc.; m.p. 44–6°.
1560	168; 170.5	**4-Bromphthalic Ac., $Br.C_6H_3(CO_2H)_2$.** — ⟨T. **4**.3b.⟩ — E.s. h. aq. — Gives anhydride: m.p. 113°; 106–8°.
1565	168–70	**Dibromalizarine, $C_{14}H_6Br_2O_4$.** — ⟨G.O.-A.⟩ — *Brown-yel.* warts fr. gl.ac.ac. — Sbl. w. part. decn. — D.s. alc., h. aq.; e.s. gl.ac.ac., chlf.; s. alk. w. dark red color!
1567	169	**Tribromanthracene, $C_{14}H_7Br_3$.** — ⟨G.O.-A.⟩ — *Yel.* ndl. — Sbl. — D.s. alc.; e.s. bz. — Oxidn. gives bromanthraquinone.
1570	169–70	**meso-α-α^1 Dibromglutaric Ac., $CH_2(CHBr.CO_2H)_2$.** — ⟨T. **4**.3a.⟩ — Pr. fr. eth. — S. aq., eth.; alm. i. chlf., bz., lgr.
1575	169	**$1^1,1^1,4^1,4^1$-Tetrabromxylene, $(CH_2Br)_2.C_6H_4$.** — ⟨G.O.-E.⟩ — **Lust.** pr. fr. chlf. — D.s. alc.; r.d.s. eth., c. CS_2.; e.s. bz.
1580	170 (blackening)	**1,2,2,3,3,4-Hexabrombutane, $CH_2Br.CBr_2.CBr_2.CH_2Br$.** — ⟨G.O.-E.⟩ — Pearly tbl. — D.s. eth.
1585	169	**Erythrene Hexabromide, $C_4H_4Br_6$.** — Pearly lft. — Sp.gr. = 3.4. — D.s. alc., eth.
1590	172 d.	**l-Bromsuccinic Ac., $CO_2H.CHBr.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — **6.3** cc. aq. sol. contain 1 g. — $(\alpha)_D = -72.6$–2.7°. — Pr. fr. aq.
1595	172	**1,3,4,6-Tetrabromnaphthol-(2), $Br_4.C_{10}H_3.OH$.** — ⟨G.O.-D.⟩ — Ndl. — Acetate: m.p. 189–90°.
1600	172–3; 175.5 c.	**4,4^1-Dibrombenzophenone, $(C_6H_4Br)_2.CO$.** — ⟨G.O.-E.⟩ — Lft. — S. CS_2, bz., h. alc.; less s. eth.
1605	170–5 d.	**Benzoquinone Tetrabromide, $C_6H_4O_2Br_4$.** — Lust. v.d.s. scales. — Zn dust + ac. ac. e. red. to hydroquinone.
1610	172–4	**3,4-Dibromnaphthoquinone-(1,2), $C_{10}H_4Br_2O_2$.** — ⟨G.O.-A.⟩ — Thick *red* lft. fr. gl.ac.ac.! — D.s. alc., eth.
1614	173	**α,α^1-Dibromsuberic Ac., $CO_2H.CHBr.(CH_2)_4.CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Pr. fr. aq. — D.s. c. aq., chlf., bz.; e.s. alc., eth. — (alc.-KOH removes Br_2.)
1615	173–4	**2,3,4,6-Tetrabrombenzoic Ac., $Br_4.C_6H.CO_2H$.** — ⟨T. **4**.3 & **4**.10.⟩ — Ndl.

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
		fr. bz. — E.s. alc., eth. — MeĀ: m.p. 77°. — Chloride: m.p. 58°; d.s. c. alc.
1620	174–5	**1,2,4,5-Tetrabrombenzene, $C_6H_2Br_4$.** — ⟨G.O.-E.⟩ — Long ndl. fr. alc. — Sp.gr. = 3.027,(20°).
1623	170–80 d.	**Dibromanthracene Tetrabromide, $C_{14}H_8Br_2.Br_4$.** — Thick tbl. fr. bz. — D.s. alc., eth., c. bz.; e.s. h. bz. — Heat gives HBr, Br & tribromanthracene.
1625	175	**α-1,4,6,7-Tetrabromnaphthalene, $C_{10}H_4Br_4$.** — Long silky ndl. fr. alc. — Sbl. in pearly tbl. — S. in 200 pt. boiling 95% alc.; d.s. eth.; s. chlf., bz. — Oxidn. w. CrO_3 in ac.ac. gives dibromphthalide, m.p. 188°, & tetrabrom-α-naphthoquinone, m.p. 224°. — Recrystd. fr. alc. gives some cryst. powd. of m.p. 175°, less sol. in eth. than orig. comp.
1630	176–7	**6,6-Dibromdiketohydrindene, $C_6H_4(CO)_2CBr_2$.** — Tbl. fr. alc. — I. aq., Na_2CO_3 sol.; s. NaOH w. yel.-red color; s. h. alc.; e.s. chlf., bz.
1635	177–8	**3-Bromnaphthoquinone-(1,2), $Br.C_{10}H_5O_2$.** — ⟨G.O.-A.⟩ — *Red* cryst.! — Sbl. undecd. — Mod. s. warm alc., bz., gl. ac.ac.; e. Na_2CO_3.
1640	178.5	**3-Bromphthalic Ac., $Br.C_6H_3.(CO_2H)_2$.** — ⟨T. **4**.3b.⟩ — Pr. ndl. — Alm. i. chlf. — Above m.p. loses aq. giving anhydride, m.p. 131°, subliming w. dif. — BaĀ: pearly tbl.; d.s. aq.
1642	178–9	**m-Bromcinnamic Ac., $Br.C_6H_4.CH{:}CH.CO_2H$.** — ⟨T. **4**.3b.⟩ — Yellowish ndl. fr. dil. alc. — E.s. alc., gl.ac.ac., h. bz., chlf.; s. eth.
1645	178 d.	**Mannitoldibromhydrine, $C_6H_8Br_2(OH)_4$.** — Cryst. — I. c. aq., alc., eth. — Decd. by h. aq.
1650	179; 177; 180–1	**9,10,12,13,15,16-Hexabromoctadecaneoic-(1) Ac., Linolenic Ac. Hexabromide, $Et.(CHBr)_2.CH_2.(CHBr)_2.(CH_2).(CHBr)_2.(CH_2)_7.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Misc. ndl. fr. bz.
1655	181; 178–9	**3,5-Dibrom-4-hydroxybenzaldehyde, $Br_2.C_6H_2.(OH)(CHO)$.** — ⟨G.O.-D.⟩ — Ndl. fr. dil. alc. — Alm. i. h. aq.; e.s. warm alc.
1660	180	**Dibromretene, $C_{18}H_{16}Br_2$.** — Colorless tbl. — Alm. i. alc., eth.; s. h. lgr.; v.s. CS_2.
1665	181	**2,3,4,5-Tetrabromhexane, $Me.(CHBr)_4.Me$.** — ⟨G.O.-E.⟩ — Pr. fr. chlf.
1667	182	**3,5-Dibrom-p-toluic Ac., $Br_2.C_6H_2.Me(CO_2H)$.** — ⟨T. **4**.3b. & **4**.10⟩ — Ndl. — E.s. alc., eth., chlf. — Amide: lft. fr. aq.; e.s. alc., eth.; m.p. 148°.
1670	184	**Octobromhexene, $C_6H_4Br_8$.** — ⟨G.O.-E.⟩ — Rhombohedra. — E.s. h. bz.
1672	185–6; 177–8	**Bromfumaric Ac., $CO_2H.CH{:}CBr.CO_2H$.** — ⟨T. **4**.3a. & **4**.10.⟩ — Lft. fr. aq. — E.s. aq. — Dec. on distn. to brommaleic anhydr. & aq. — BaĀ. 3½ H_2O: pr.; 100 pt. aq. @ 16° dis. 3.67 pt. — Me_2Ā: cryst. fr. eth.; m.p. 30°.
1675	186	**2,5(?)-Dibromhydroquinone, $Br_2(HO)_2.C_6H_2$.** — ⟨G.O.-D.⟩ — Ndl. fr. boiling aq. — Alm. i. c. aq.; e.s. alc., eth.; s. chlf., bz. — Br-water gives dibromquinone.
1680	184; 185–6	**Dibromphloron,(p-Xyloquinone), $Me_2{:}C_6Br_2O_2$.** — Glassy tbl. fr. dil. ac.ac. — V.d.s. c. alc.; s. eth., bz.
1685	187	**5-Brom-o-toluic Ac., $Br.C_6H_3.Me(CO_2H)$.** — ⟨T. **4**.3b.⟩ — Sbl. in ndl. — V.d.s. h. aq.; e.s. alc. — Alk.$KMnO_4$ oxid. to 4-bromphthalic Ac.
1686	187; 192–3	**Tetrabrompyrocatechol, $Br_4.C_6(OH)_2$,(HO:HO = 1:2).** — ⟨G.O.-D.⟩ — Long ndl. — Gives dark blue color w. $FeCl_3$!
1687	187	**3,3-Dibrom-2,2-dimethylbutane, $Me_3C.CBr_2.Me$.** — ⟨G.O.-E.⟩ — V. volat. cryst. — Heated w. aq. & $CaCO_3$ @ 100° gives pinacolin.
1690	188	**2,5-Dibrombenzoquinone, $C_6H_2Br_2O_2$.** — ⟨G.O.-A.⟩ — *Gold-yel.* lft. fr. abs. alc. — Sbl. — I. aq.; s. alc., eth., bz., gl.ac.ac. — Boiled w. conc. NaOH sol. gives bromanilic ac. & dibromhydroquinone.
1695	188	**1-Bromanthraquinone, $BrC_6H_3.(CO)_2.C_6H_4$.** — ⟨G.O.-A.⟩ — *Yel.* ndl. fr. bz.! Sbl. — KOH fusion gives 1-hydroxyanthraquinone.
1700	186.5; 188–9	**2,4,6-Tribrombenzoic Ac., $Br_3.C_6H_2.CO_2H$.** — ⟨T. **4**.3b. & **4**.10.⟩ — Ndl. — 1000 cc. aq. dis. 5 1/2 g. @ 100°, or 3 1/2 g. @ 15°. — MeĀ: ndl. fr. dil. alc.; m.p. 68°. — Chloride: m.p. 47°. — Amide: m.p. 191–2°; d.s. h. aq.

No.	Melting-point	" ADDITIONAL ELEMENT " — BROMINE. — SOLIDS.
1705	190–1	**Tribromphthalic Ac., $Br_3.C_6H.(CO_2H)_2$.** — ⟨T. **4**.3.⟩ — Silvery lft. fr. h. aq. — Alm. i. c. aq.; e.s. alc.. eth.; alm. i. lgr. — Loses aq. above m.p. giving anhydride, m.p. 157°, wh. sbl. in lft., i. c. aq. & changed to acid by h. aq. — $Ba\bar{A}.2H_2O$: floc. ppt. crystg. fr. h. aq. in lft.
1707	192; 169–70	**2,3-Dribrom-2,3-dimethylbutane, Tetramethylethylenedibromide, $Me_2.CBr.CBrMe_2$.** — ⟨G.O.-E.⟩ — Long ndl. fr. eth. — E.s. eth.; s. alc., bz. — W. K_2CO_3 & aq. @ 100° gives pinacone & pinacoline.
1710	191–2	**3,4-Dibrompyromucic Ac., $\ulcorner CBr.CBr:CH.O.C(CO_2H)\urcorner$.** — ⟨T. **4**.3⟩ — Scales fr. aq. — Sbl. — 100 pt. aq. sol. @ 20° contains 0.22 pt. — V.s. alc., eth.; v.d.s. CS_2, lgr. — V. stable (not at. by CrO_3 sol.). — $Na\bar{A}.2H_2O$: silky ndl., not v.s. aq. — $Ba_2\bar{A}.3H_2O$: flat ndl. (100 pt. aq. sol. @ 20° contains 0.35 g. anhydrous salt). — $Et\bar{A}$: ndl. fr. alc.; m.p. 67–8°; e.s. eth., chlf., bz.; r.d.s. c. alc.
1715	193–4	**4^1-Bromphenylbenzoic Ac., $BrC_6H_4.C_6H_4.CO_2H$.** — ⟨T. **4**.3b in alc.⟩ — Ndl. — D.s. c. alc.; e.s. eth.
1717	194–5	**Dibrommesitylenic Ac., $Br_2.C_6H.Me_2,CO_2H$.** — ⟨T. **4**.3b.⟩ — Sbl. in lust. ndl. — V.d.s. c. aq.; e.s. c. alc.; less s. bz. — $Ba\bar{A}_2.3\frac{1}{2}H_2O$: pr.; mod. s. aq.
1718	196; 190 d.	**β,β^1-Dibromadipic Ac., $CO_2H.CH_2.(CHBr)_2.CH_2.CO_2H$.** — ⟨T. **4**.3a.⟩ — Ndl. — E.s. alc., eth., h. aq. — $Me_2\bar{A}$: ndl.; m.p. 84°.
1720	195	**p-Bromphenyl Dibromsalicylate, Tribromsalol, $Br_2(HO).C_6H_2.CO_2.C_6H_4Br$.** — ⟨G.O.-E.⟩ — Ndl. fr. chlf. — D.s. alc., eth.; s. chlf. — (Pat. Frdl. **IV**, 1187).
1725	196	**2,3-Bromhydroxy-α-naphthoquinone, $Br(HO).C_{10}H_4O_2$.** — ⟨G.O.-A.⟩ — *Yel.* cryst. fr. dil. alc.! — Sbl. w. decn. — Alm. i. aq.; e.s. h. aq.; v.d.s. eth., bz. — HNO_3 oxidn. gives phthalic ac. — Salts, d.s. aq. — $Ba\bar{A}_2.3Aq.$: cryst. or ppt. s. in 1464 pt. aq. @ 13°.
1727	200–1; 195	**2,5-Dibrom-p-toluic Ac., $Br_2.C_6H_2.Me(CO_2H)$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. alc. — $Ba\bar{A}_2.2H_2O$: thin ndl. s. in 77 pt. aq. @ 20°, or in 31 pt. @ 100°. — Chloride: ndl.; m.p. 60°.
1730	199; 209	**4,6-Dibrom-1,2,3,5-tetramethylbenzene, $Br_2.C_6Me_4$.** — ⟨G.O.-E.⟩ — Ndl. — D.s. c. alc.
1732	204 (r.h.); 193–4 d. (slow heating)	**Mesodibrompyrotartaric Ac., $Me.CBr(CO_2H).CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — Warts. — 100 pt. aq. sol. @ 13° cont. 24.1 pt. — Boiled w. $2Na_2CO_3$ sol. gives CO_2, HBr, propionic ald., etc.
1735	199; 202–3	**3,6-Dibrom-1,2,4,5-tetramethylbenzene, $Br_2.C_6.Me_4$.** — ⟨G.O.-E.⟩ — B.p. 317°. — Long thin ndl. fr. alc. — Sbl. — Alm. i. c. alc.; r.d.s. h. alc.
1740	Sbl. w. m. 200	**1,1,2,2-Tetrabrombutane, $CHBr_2.CBr_2.CH_2.Me$.** — ⟨G.O.-E.⟩ — Cryst.
1745	200–5	**α-Tolane Dibromide, PhCBr:PhCBr.** — ⟨G.O.-E.⟩ — Cryst. — D.s. h. alc., eth. — Alc.-KOH gives tolane.
1747	203.5–4	**2-Bromtoluic Ac., $Br.C_6H_3.Me(CO_2H),(CH_3 = 1)$.** — ⟨T. **4**.3.⟩ — Ndl. fr. h. aq. — I. c. aq.; d.s. h. aq. — $Ba\bar{A}_2.4H_2O$: hair-like ndl.; v.d. s. c. aq.
1750	204	**Bromopianic Ac., $(MeO)_2.C_6HBr(CHO)CO_2H$.** — ⟨T. **4**.3a.⟩ — Ndl. fr. h. aq. — V.d.s. c., mod. s. h., aq.; e.s. alc., eth. — $Ba\bar{A}_2.H_2O$: cryst. crusts; e.s. aq.
1755	204–5	**Dibromidryl, $C_{15}H_8Br_2$.** — Yellowish-green ndl. fr. CS_2. — V.d.s. alc., eth., c.CS_2; s. h. CS_2.
1760	d.w.m. 200–210	**Hexabromethane, C_6Br_6.** — ⟨G.O.-E.⟩ — Rhomb. pr. — *Not* vol. w. st. — D.s. h. alc., eth.; e.s. CS_2. — Dec. @ 200–10° to Br & tetrabromethylene.
1765	205 d., 217	**1,1,1,2-Tetrabrom-2-methylpropane, $CBr_3.CBrMe_2$.** — ⟨G.O.-E.⟩ — Tbl. — E.s. alc., eth.
1770	207–8	**Dibromhydroxyanthraquinone, $Br_2(HO).C_6H.(CO)_2.C_6H_4$.** — ⟨G.O.-D.⟩ — *Yellowish* ndl. fr. abs. alc.! — Mod. s. alc. w. red-yel. color, without fluoresc. — S. alk.-ammon. sol. gives br.-red ppt. w. $BaCl_2$. — W. NaOH @ 200° gives alizarine.
1775	206–7 d.; 207–8	**3,4,5,6-Tetrabromcresol-(2), $Br_4(HO).C_6.Me$.** — ⟨G.O.-D.⟩ — Ndl. fr. gl. ac.ac. — E.s. alc.; mod. s. lgr.; d.s. c. gl.ac.ac.

No.	Melting-point	"ADDITIONAL ELEMENT" — BROMINE. — SOLIDS.
1780	209	**6-Brom-m-toluic Ac., $Br.C_6H_3.Me,CO_2H$.** — ⟨T. **4**.3.⟩ — Cryst. powd. fr. alc. — V.d.s. h. aq., c. al.; s. h. alc. — Na amalgam gives m-toluic ac.
1785	210	**5,6-Dibrom-1,2,3,4-tetramethylbenzene, $Br_2.C_6Me_4$.** — ⟨G.O.-E.⟩ — Pr. fr. alc. + toluene.
1787	212–2.8	**o-Bromcinnamic Ac., $Br.C_6H_4.CH:CH.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. alc. — E.s. h. alc., eth.; d.s. chlf., bz., CS_2.
1790	213–4c.; 207	**3,5-Dibrom-4-methoxybenzoic Ac., $Br_2.C_6H_2.(OMe)(CO_2H)$.** — ⟨T. **4**.3.⟩ — Cryst. fr. alc. — Sbl. — AgĀ: ndl.; v.d.s. h. aq. — MeĀ: ndl. fr. alc.; m.p. 92°c.
1795	213–14	**Tetrabrom-4,4'-dihydroxybenzophenone, $[C_6H_2Br_2(OH)]_2.CO$.** — Cryst. fr. alc. — R.d.s. alc.; alm. i. chlf.; s. dil. alk. — Dist. undecd.
1800	210–15 d.	**Hexabromethane, Perbromethane, C_2Br_6.** — ⟨G.O.-E. — Decd. to Br & C_2Br_4 at abt. 210°.
1805	212	**(α)-trans-Benzene Hexabromide, $C_6H_6Br_6$.** — ⟨G.O.-E.⟩ — Monoclin. pr. fr. xylene. — D.s. alc., eth. — Alc.-KOH gives 1,2,4-tribrombenzene (m.p. 44°).
1807	213–4; 218–8.5 c.	**3-Brom-4-methoxybenzoic Ac., $Br.C_6H_3.(OMe)(CO_2H)$.** — ⟨T. **4**.3b.⟩ — Dist. undecd. — Sbl. in lft. — AgĀ: floc. ppt.; delicate ndl. fr. boiling aq.
1808	214–5	**2-Brommesitylenic Ac., $Br.C_6H_2Me_2.CO_2H$.** — ⟨T. **4**.3b.⟩ — Monoclin. cryst. fr. alc. — Alm. i. c. aq.; v.d.s. h. aq.; e.s. h. alc. — BaĀ₂: ndl. s.h. aq.
1810	215	**Dibrom-α,α-binaphthyl, $C_{20}H_{12}Br_2$.** — Monoclin. pr. fr. bz. — V. stable. — Alm. i. alc.; d.s. eth.; e.s. bz.; v.s. CS_2.
1815	218	**2,3-Dibrom-α-naphthoquinone, $C_{10}H_4Br_2O_2$.** — ⟨G.O.-A.⟩ — *Yel.* ndl. fr. gl.ac.ac.! — S. in over 1000 pt. c. alc.; d.s. eth., lgr., ac.ac. — Cryst. unchanged fr. warm fuming HNO_3. — 4 pt. boiled w. 10 pt. aniline & 400 pt. alc. give aniline-2,3-dibrom-α-naphthoquinone: red lft., met. lust., d.s. alc., m.p. 194°.
1820	219–20	**3-Bromsalicylic Ac-(1), $Br(HO).C_6H_3.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. — Gives dark red-blue col. w. $FeCl_3$! — PbĀ₂: ppt.
1825	219.5–20.5; 223–7; 209	**3,5-Dibrombenzoic Ac., $Br_2.C_6H_3.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. — D.s.c. aq.; e.s. alc., eth. — Sbl. — MeĀ: m.p. 63°. — Chloride: m.p. 41°. — Amide: m.p. 187°, d.s. h. aq.
1835	221–2; 219–20 d.; 227	**Dibromfumaric Ac., $CO_2H.CBr:CBr.CO_2H$.** — ⟨T. **4**.3.⟩ — Cryst. fr. aq. — V.s. alc., eth. — At 230° evolves HBr. — AgĀ.$\frac{1}{2}H_2O$: ndl. wh. explode violently on heating. — BaĀ: pr. (fr. aq., bz., abs. alc.); 100 pt. aq. @ 16° dis. 59.52 pt. — Et₂Ā: pr. fr. lgr.; m.p. 67–8°.
1837	221	**9,10-Dibromanthracene, $C_6H_4.C_2Br_2.C_6H_4$.** — ⟨G.O.-A.⟩ — *Gold-yel.* ndl. fr. toluene! Sbl. — V.d.s. alc., eth.; s. h. bz. — W. alc-KOH @ 160° gives anthracene etc. — Oxidg. agts. give anthraquinone. (Vol. I.)
1840	223; 218–9	**3,5-Dibromsalicylic Ac-(1), $Br_2(HO).C_6H_2.CO_2H,(CO_2H = 1)$.** — ⟨T. **4**.3b.⟩ — Long ndl. — D.s. h. aq.; e.s. alc. — $FeCl_3$ gives violet color! — BaĀ₂.$4H_2O$: long ndl. — MeĀ: lust. ndl.; d.s. c. alc.; m.p. 148–9°.
1845	220–30 d.	**Tetrabromphenolphthaleine, $C_{20}H_{10}Br_4O_4$.** — Thick ndl. fr. eth. — V.d.s. alc.; e.s. eth. — S. alk. w. violet color wh. disappears at once w. x.s. alk.!
1850	225	**Pentabromphenol, $Br_5.C_6.OH$.** — ⟨G.O.-D.⟩ — Large ndl. of adamantine lustre fr. CS_2. — Sbl. — Heated w. conc. HNO_3 gives bromanil & brompicrin. — Salts, d.s. — Acetate: (fr 1/2 hr. boiling w. 2 pt. ac. anhydr.); ndl. fr. gl.ac.ac.; v.d.s. alc.; e.s. bz.
1855	224	**2,4,6-Tribrom-1,3,5-trimethylbenzene, $Br_3.C_6Me_3$** — ⟨G.O.-E.⟩ — Cryst. fr. alc. or bz. — Alm. i. c. alc.; v.d.s. h. alc.
1860	225–6; 233	**Tribrom-1,2,4-trimethylbenzene, $Br_3.C_6.Me_3$** — ⟨G.O.-E.⟩ — D.s. h. alc.; e.s. h. toluene. — Sbl.
1865	227–30	**2,4-Dibrompurpuroxanthin, $Br_2.(HO)_2C_{14}H_4O_2$.** — ⟨G.O.-A.⟩ — *Or.* ndl. fr. gl.ac.ac. — D.s. alc.; e.s. gl.ac.ac.
1870	230	**Dibromphenanthrenequinone, $Br_2.C_{14}H_6O_2$.** — ⟨G.O.-A.⟩ — *Yel.* warts fr. gl.ac.ac.! — D.s. alc., gl.ac.ac.; e.s. xylene.

No.	Melting-point	" ADDITIONAL ELEMENT " — **BROMINE.** — SOLIDS.
1875	232–3	**3,4-Dibrombenzoic Ac., $Br_2.C_6H_3.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. — V.d.s. aq.; e.s. alc., eth. — $Ba\bar{A}_2.4Aq.$: ndl.; v.d.s. c. aq. — EtĀ: ndl. fr. chlf., m.p. 38°. — Amide: ndl.; m.p. 151.5°.
1880	230	**2,2,3,3-Tetrabrombutane, $Me.CBr_2.CBr_2.Me$.** — ⟨G.O.-E.⟩ — Tetrag. cryst. fr. lgr. at room temp., becoming turbid & rhombic at −10°. — Alm. i. alc.; e.s. lgr.
1885	233	**2,4-Dibrom-1-hydroxyanthraquinone, $Br_2,(HO).C_6H.(CO)_2.C_6H_4$.** — ⟨G.O.-A.⟩ — *Red-yel.* ndl.! — S. in NaOH sol., red. — (D.R.P. 127532.)
1890	235–6	**Tribromtoluquinone-(2), $MeC_6Br_3O_2$.** — ⟨G.O.-A.⟩ — Sm. *golden* tbl. fr. alc.! — I. aq.; d.s. c. alc.; e.s. eth., bz.
1895	234–5 sl.d.	**Pentabrombenzoic Ac., $C_6Br_5.CO_2H$.** — ⟨T. **4**.3b.⟩ — **Lft.** fr. dil. alc. — Alm. i. h. aq.; d.s. h. bz.; salts, d.s.
1900	234–5	**3,4,5-Tribrombenzoic Ac., $Br_3.C_6H_2.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. — E.s. h. aq.; more s. dil. alc., or h. bz. — MeĀ: ndl. fr. alc.; m.p. 154°. — EtĀ: m.p. 126°. — Chloride: m.p. 83°. — Amide: m.p. 199–200°; d.s. h. aq.
1905	235–6	**Bromdiphenic Ac., $C_{14}H_9BrO_4$.** — Pr. fr. gl.ac.ac. — Alm. i. h. aq.; e.s. alc., eth.; d.s. bz., chlf., CS_2. — $Ba\bar{A}.3Aq.$: ndl.; d.s. c. or h. aq.
1907	235–6	**2,6-Dibrom-p-toluic Ac., $Br_2.C_6H_2.Me(CO_2H),(Me = 1)$.** — ⟨T. **4**.3b.⟩ — Silky ndl. fr. alc. — E.s. alc., eth., chlf. — Chloride: ndl. fr. eth.; m.p. 80°. — Amide: Ndl. fr. eth.; m.p. 117°.
1910	237	**1,3-(or 4)-5,7,8-Pentabromnaphthol-(2), $Cl_5.C_{10}H_2.OH$.** — ⟨G.O.-D.⟩ — Ndl. — I. alc., eth., gl.ac.ac.; d.s. h. bz. — NaĀ: long silky ndl.
1915	238–9	**Pentabromnaphthol-(1), $Br_5.C_6H_2.OH$.** — ⟨G.O.-D.⟩ — Ndl. — Alm. i. alc., eth.; d.s. h. cumene. — Oxdn. w. dil. HNO_3 gives first tetrabrom-α-naphthoquinone, then phthalic ac. — NaĀ: ndl. fr. alc.; v.s. aq.; e.s. alc.
1920	237	**α-Stilbene Bromide, Ph.CHBr.CHBr.Ph.** — ⟨G.O.-E.⟩ — Silky ndl. — S. in. 4700 pt. abs. alc. @ 18°, or in 1025 pt. eth. — Alc.-KOH gives bromstilbene & then tolane. Heat partially changes to much more sol. β-isomer of m.p. 110°.
1925	244	**Tetrabromhydroquinone, $Br_4.C\ (OH)_2$.** — ⟨G.O.-A.⟩ — Ndl. fr. gl.ac.ac. — I. h. aq.; e.s. alc., eth. — $FeCl_3$ oxid. to bromanile: golden cryst. fr. bz.; i. aq.; m.p. 300°.
1930	245	**x-Bromalizarine, $Br(HO)_2.C_{14}H_5O_2$.** — ⟨G.O.-A.⟩ — *Red-yel.* ndl.! — Sbl. undecd. — D.s. alc., gl.ac.ac., bz. — S. dil. alk. w. intense purple color! — (D.R.P. 77179.)
1935	236.5 unc.; 245	**α-Dibromanthraquinone, $C_{14}H_6Br_2O_2$.** — ⟨G.O.-A.⟩ — *Light yel.* ndl.! — Dist. alm. undecd. — V.d.s. alc.; more s. bz., chlf. — KOH fusion @ 200° gives alizarine, etc.
1940	245	**4,5,6-Tribrom-1,2,3-trimethylbenzene, $Br_3.C_6Me_3$.** — ⟨G.O.-E.⟩ — Ndl. — V.d.s. alc.
1945	245–6; 252	**Hexabromnaphthalene, $C_{10}H_2.Br_6$.** — Ndl. — I. alc., eth.; s. h. bz., toluene.
1950	251	**p-Brombenzoic Ac., $Br.C_6H_4.CO_2H$.** — ⟨T. **4**.3b. & **4**.10.⟩ — **Lft.** fr. h. aq. — Alm. i. c. aq.; e.s. alc., eth. — MeĀ: m.p. 74°; 81°; 78°. — Chloride: m.p. 42°. — Amide: m.p. 189.5° c.; pearly tbl.; s. alc.; i.c. aq. — Anilide: m.p. 197°; e.s. alc.
1952	251–2	**p-Bromcinnamic Ac., $Br.C_6H_4.CH{:}CH.CO_2H$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. dil. alc.
1955	253	**(β)-cis-Benzene Hexabromide, $C_6H_6.Br_6$.** — ⟨G.O.-E.⟩ — Reg. cryst. fr. bz. — I. alc., eth. — Alc.-KOH gives 1,2,4-tribrombenzene, m.p. 44°.
1957	254	**Tetrabromanthracene, $C_{14}H_6Br_4$.** — ⟨G.O.-A.⟩ — Long *yel.* ndl. fr. bz. — V.d.s. c. alc., eth., bz.; more s. h. xylene. — Oxidn. gives dibromanthraquinone.
1960	abt. 255 d. (s.t.)	**s-Dibromsuccinic Ac. (high melting), $CO_2H.CHBr.CHBr.CO_2H$.** — ⟨T. **4**.3a.⟩ — [Does not melt in open tube, but sbl. fr. 250–80°. In s.t. dark spots appear abt. 250°, then melts sharply w. HBr evoln. @ 255–6° on gradual heating. If s.t. is brought into bath already at 255°, melts @ 260–1°]. — Cryst. — 100 pt. aq. dis. 2.04 pt. @ 17°. — E.s. h. aq., alc., eth. — $Ag_2\bar{A}$: ppt. alm. i. aq. — $Me_2\bar{A}$: fr. MeOH + HCl, (Ber. **12**, 2281) tbl.; m.p.

No.	Melting-point	"ADDITIONAL ELEMENT" — BROMINE. — SOLIDS.
		62°. — Boiled w. 4 mol. $\bar{N}$ NaOH sol. gives acetylenedicarbonic ac. & HBr (smoothly).
1965	255 d.	**1,1,1-Tribromacetone, $Me.CO.CBr_3$.** — ⟨G.O.-E.⟩
1970	255; (227)	**ω_6-Hexabromhexamethylbenzene, $C_6.(CH_2Br)_6$.** — ⟨G.O.-E.⟩ — Rhomb. tbl. fr. ethylene bromide. — Alm. i. alc., eth., CS_2, bz., CCl_4.
1975	258	**Tetrabrommorin, $Br_4.C_{15}HO_2(OH)_5$.** — Ndl. — S. in alk. w. intense yel. color! — Colors silk or wool yel. fr. acid bath. — (Fr. morin & Br in gl.ac.ac.).
1980	259–60; 250–5 d.	**Brompicrotoxinin, $C_{15}H_{15}O_6Br$.** — Lust. ndl. fr. dil. alc. — Alm. i. aq.; c.s. chlf.; d.s. alc., eth. — $(\alpha)_D^{17} = -132.5°$ in chlf. (c = 1.0695). — (Fr. Br-aq. & picrotoxin.)
1985	262	**Tetrabrom-o-xylene, $Br_4.C_6Me_2$.** — ⟨G.O.-E.⟩ — B.p. 374–5°. — Lust ndl. fr. bz. — V.d.s. h. alc.; e.s. h. bz.
1990	260–70	**Dibromfluoresceine, $C_{20}H_{10}O_5Br_2$.** — ⟨G.O.-A.⟩ — *Red-brown* ndl. w. greenish reflect. — D.s. alc., gl.ac.ac.; e.s. alk. — (Fr. fluorescein & Br_4).
1995	266	**Tetrabromphthalic Ac., $Br_4.C_6.(CO_2H)_2$.** — ⟨T. **4**.3.⟩ — Ndl. fr. h. aq. — V.d.s. solvents. — In melting gives anhydr. wh. sbl. in lust. ndl., m.p. 259°, 270°, d.s. solvents. — $Ba\bar{A}$: gran. cryst. ppt.
2000	268 d.	**3,5-Dibrom-4-hydroxybenzoic Ac., $Br_2.C_6H_2.(OH)(CO_2H)$.** — ⟨T. **4**.3b.⟩ — Ndl. fr. dil. alc. — Alc. sol. gives red-yel. ppt. w. $FeCl_3$. — Na-amalgam give p-hydroxybenzoic ac.
2005	273	**Dibromchrysene, $C_{18}H_{10}Br_2$.** — ⟨G.O.-E.⟩ — Lust. ndl. fr. bz. — Sbl. — V.d.s. solvents. — Oxidn. in gl.ac.ac. w. CrO_3 gives chrysoquinone. — (Alc.-KOH first attacks at 170–80°).
2015	274–5; 265	**β-Dibromanthraquinone, $C_{14}H_6Br_2O_2$.** — ⟨G.O.-A.⟩ — *Yel.* ndl. fr. xylene. — Dist. w. sl. decn. @ 250°. Gives alizarine in KOH fusion.
2020	276	**Brompurpurine, $Br(HO)_3.C_{14}H_4O_2$.** — ⟨G.O.-A.⟩ — *Deep red* ndl. fr. gl.ac.ac.
2025	282–3	**Pentabromtoluene, C_6Br_5Me.** — Ndl. fr. bz. — S. @ 20° in 102 pt. bz. — Sbl. — D.s. gl.ac.ac., alc.
2027	283	**4-Bromisophthalic Ac., $Br.C_6H_3.(CO_2H)_2$.** — ⟨T. **4**.3.⟩ — Ndl. fr. alc. — $Ba\bar{A}.H_2O$: S. aq.
2030	284 d.	**Tribromflavorpurpurine, $Br_3(HO)_3.C_{14}H_2O_2$.** — ⟨G.O.-A.⟩ — *Or.-yel.* ndl. — D.s. gl.ac.ac. — in NaOH sol. w. deep purple color.
2032	288–92	**Tetrabromisophthalic Ac., $Br_4.C_6.(CO_2H)_2$.** — ⟨T. **4**.3.⟩ — Ndl. fr. h. aq. — I. bz.
2035	294–6	**Dibrompicene, $C_{22}H_{12}Br_2$.** — Ndl. fr. xylene. — I. alc., bz., chlf., gl.ac.ac.; e.s. h. xylene. — Igntn. w. CaO gives picene (m.p. 364° c.)
2040	295	**Tetrabromanthraquinone, $C_{14}H_4Br_4O_2$.** — ⟨G.O.-A.⟩ — *Yel.* scales fr. toluene! — S. chlf., toluene, CS_2, nitrobenzene. — (Pat.).
2042	304–5; 301–3; 291–7.	**Bromterephthalic Ac., $Br.C_6H_3.(CO_2H)_2$.** — ⟨T. **4**.3 & **4**.10.⟩ — Mic. ndl. — 1000 pt. aq. @ 24° dis. 1.1 to 1.8 pt.; e.s. h. aq., alc.; alm. i. c. eth.; i. bz. — Chloride: oil; b.p. 305° c. — Amide: ndl. fr. h. aq.; m.p. 270° (made fr. chloride). — $Me\bar{A}$: ndl.; m.p. 59°, 49°.
2045	300	**Tetrabrombenzoquinone, Bromanil, $C_6Br_2O_2$.** — ⟨G.O.-A.⟩ — *S-yellow* monoclin. lft. or tbl. fr. gl. ac.ac. or bz. — Sbl. in cryst. — I. aq.; d.s. c. alc., eth.; s. h. alc. — SO_2 red. to tetrabromhydroquinone (w. a little tribrom-).
2046	abt. 300 d.	**2,3,5,6-Tetrabromterephthalic Ac., $Br_4.C_6.(CO_2H)_2$.** — Ndl. fr. h. aq. — Alm. i. bz.
2055	above 315	**Hexabrombenzene, C_6Br_6.** — Ndl. fr. toluene. — Alm. i. h. alc.; d. sol. toluene, chlf., bz.
2060	316–7	**2,5-Dibromterephthalic Ac., $Br_2.C_6H_2.(CO_2H)_2$.** — Lust. lft. fr. gl. ac. ac. — D.s. h. aq., bz., lgr.; e.s. alc., eth., gl. ac.ac. — Ignitn. w. CaO gives p-dibrombenzene. — Chloride: pr. fr. eth.; m.p. 80–1°; alm. i. bz., lgr. — $Me_2\bar{A}$: m.p. 123–5°.

ANALYTICAL TABLES

OF

ORDER IV

COMPOUNDS CONTAINING BROMINE AS "ADDITIONAL ELEMENT"

DIVISION B, LIQUID SPECIES.

SECTION 1. WITH SPECIFIC GRAVITY HIGHER THAN 1.50

No.	Boiling-point (C.°)	Specific Gravity	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
3000	abt. –2		**Bromacetylene, Bromethine, $CBr : CH$.** — Ignites spontaneously in air w. sep. of carbon! — Solution phosphoresces for days in air like P, & gives ozone reac. — Vapors have odor like P & are toxic. — Polym. by light. — Gives ppt. of Cu acetylide in ammon.-CuCl sol !
3005	4.5 (757.6)	1.732 (0°)	**Methyl Bromide, MeBr.** — W. aq. @ 11° gives cryst. hydrate.
3010	16 (750)	1.5167 (14/4)	**Vinyl Bromide, Bromethene, $CHBr : CH_2$.** — n_D = 1.44622. — Odor ethereal. — Polym. to white mass in sunlight. — Sl. s. aq. — (AgĀc. @ 100° without action). — Aq.-sol. HBr (*sat. at 4°*) gives ethylene bromide.
3015	64.5 sl. d.	2.45 (15°)	**Carbonyl Bromide, $CO.Br_2$.** — ⟨‡⟩ — Odor irritating! — Becomes red in light, or on heating. — V.e. decd. by c. aq.
3025	abt. 76 (detd. under water.)	abt. 2.0	**Dibromacetylene, C_2Br_2.** — Odor v. unpleasant, carbylamine-like! — V. toxic. — I. aq.; s. org. solv. — Heated, explodes w. sepn. of C. — Ignites spontaneously in air! — Adds Br_2 forming $CBr_2 : CBr_2$.
3030	76 (750)	1.52 (9.5°)	**Acetyl Bromide, Me.COBr.** — ⟨‡⟩ — Fumes strongly in air.
3035	87	1.531 (12°)	**Brommethyl Eth., $BrCH_2.O.Me$.** — ⟨*⟩ — (Fr. HBr, MeOH & formic ald.)
3040	88–90	1.52 (20°)	**3-Brompropine-(1), Propargyl Bromide, $CH : C.CH_2Br$.** — ⟨*⟩ — Adds 2 or 4 Br.
3045	91–2 (754)	2.1780 (20.6/4)	**1,1-Dibromethene, $CH_2 : CBr_2$.** —⟨*⟩ — Polym. e. to comp. i. aq., alc., eth. — Absorbs O. from air when h. to form bromacetylbromide, $CH_2Br.COBr$! — (Alc.-KOH gives bromacetylene.)
3050	80–105		**Bromacetaldehyde, $CH_2Br.CHO$.** — ⟨*⟩ — Odor powerful! — Red. Fehling's sol.! — (Baryta sol. gives glycollic ald.).
3055	96.5–7.5c.	2.499 (15°)	**Methylene Bromide, CH_2Br_2.** — ⟨*⟩ — Heated w. x.s. PbO & 20 pt. aq. @ 150° gives ethylene glycol.
3060	104c.	1.52 (9.5°)	**Propionyl Bromide, Et. COBr.** — ⟨*⟩.
3065	108–10c.	2.06 (20/4); 2.09 (20.5/4)	**Ethylidene Bromide, 1,1-Dibromethane, $Me.CHBr_2$.** — ⟨*⟩ — Unlike ethylene bromide, is not attacked by alc.-KHS sol.
3070	110	2.2714 17. (5/4)	**1,2-Dibromethene, Acetylene Dibromide, $CHBr : CHBr$.** — ⟨*⟩ — Odor chlf.-like. — Adds Br_2 to give acetylene tetra-

Explanation of typographical signs used in this Section: * = G.O.-E. & T. 4.7. ‡ = T. 4.11.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENT " — BROMINE. — LIQUIDS.
			bromide. — Gently warmed w. 2 mol. alc. — NaOH gives bromacetylene. — $n_D^{20} = 1.5428$. — No tendency to polymerize.
3075	113 (750)	1.555	*α*-**Bromisobutyric Ald., Me$_2$.CBr.CHO.** — ⟨G.O.-E.⟩ — Vapor v. irritating to eyes. — Alm. i. aq. — Red. ammon. AgNO$_3$! — Readily polymerized to para form, m.p. 128–9°. — (NaOH removes Br).
3080	115 (760)	1.815 (0°)	**2,2-Dibrompropane, Bromacetole, Me.CBr$_2$.Me.** — ⟨*⟩ — (Alc.-KOH gives 2-brompropene No. **4.**4505). — Aq. @ 160° gives acetone.
3085	116–8		**Isobutyryl Bromide, Me$_2$.CH.COBr.** — ⟨‡⟩ — Corresp. amide: tbl. fr. bz.; m.p. 129°.
3090	abt. 120d. (749)	1.68	*α*-**Bromacrolein, CH$_2$: CBr.CHO.** — Mobile liq. — Odor intensely irritating! — S. h.aq.; misc. alc., eth.
3095	125–6		**1,1-Dibrompropene-(1), CBr$_2$: CH.Me.** — ⟨*⟩ — Heating w. alc.-KOH gives allylene.
4000	128		**Butyryl Bromide, Et.CH$_2$.COBr.** — ⟨*⟩.
4005	127–31; 132	2.05 (0°) 1.98 (15°)	**1,2-Dibrompropene-(1); Allylene Dibromide, CHBr : CBr.Me.** — ⟨*⟩ — Na gives allylene.
4010	abt. 130		**1,1-Dibrompropane, Et.CHBr$_2$.** — ⟨*⟩.
4015	131.6; 130.3 (759.5)	2.182 (20/4)	**Ethylene Bromide, 1,2-Dibromethane, CH$_2$Br.CH$_2$Br.** — ⟨*⟩ — M.p. + 8°! — Odor sweetish. — Warm alc.-KOH gives vinylbromide (No. 4.3010) easily — & in x.s., acetylene (Vol. I.). Diluted w. alc. evolves ethylene vigorously when warmed w. gran. Zn freshly cleaned by acid!
4020	132	1 98 (15°)	**1,2-Dibrompropene-(1), Allylene Dibromide, Me.CBr : CHBr.** — ⟨*⟩ — W. Na gives allylene.
4025	136.5 (725)	1.99	**Bromacetone, CH$_2$Br.CO.Me.** — ⟨G.O.-E.⟩ — Vapor v. irritating, provoking flow of tears! — Cannot be distd. without decn. at ord. pressure except in small quantities. — B.p. 48–53° @ 25–26 mm. — D.s. aq.; e.s. alc., acetone. — Unites w. NaHSO$_3$. — (K$_2$CO$_3$ removes Br).
4030	137	1.90 (15°)	*α,α*-**Dibrompropionic Ald., Me., Me.CBr$_2$.CHO.** — ⟨G.O.-E.⟩ — Odor pungent. — Gives e.s. cryst. hydrate w. 2H$_2$O of m.p. 42°.
4035	141.6c.	1.9333 (20/4)	**1,2-Dibrompropane, Propylene Bromide, CH$_2$Br.CH$_2$.CH$_2$Br.** — ⟨*⟩ — W. Zn & ac.ac. evolves propylene vigorously. — (Alc.-KOH gives isomeric C$_3$H$_5$Br; w. x.s., allylene, C$_3$H$_4$.)
4040	140–43		**2,3-Dibrompropylene-(1),** *α*-**Epidibromhydrine, CH$_2$: CBr.CH$_2$-Br.** — ⟨*⟩ — Heated w. Zn dust & alc. gives s-allylene, CH$_2$:-C: CH$_2$.
4045	142		**Dibromacetaldehyde, CHBr$_2$.CHO.** — ⟨G.O.-E.⟩ — V. s aq., alc. — Gives solid polymer, i. aq., on keeping. H$_2$O gives hydrate: m.p. 58–60°. — Decd. by alk.
4050	144–5		**2,2-Dibrombutane, Me.CBr$_2$.Et.** — ⟨*⟩ — W. aq. @ 160° gives methylethylketone.
4055	146 (751)	2.89 (15°)	**Bromoform, CHBr$_3$.** — ⟨*⟩ — M.p. = + 9°. — Alc.-KOH gives CO & C$_2$H$_4$.
4060	146–7		**2,3-Dibrombutylene-(2), Crotonylene Bromide, Me.CBr : CBr-Me.** — ⟨*⟩.
4065	149	1.798 (14°)	**1,2-Dibrom-2-methylpropane, Me$_2$CBr.CH$_2$Br.** — ⟨*⟩ — (Alc. -KOH gives Me$_2$C : CHBr.) — 20 vol. aq. + PbO @ 150° gives isobutyric ald.
4070	149–50		**(higher boiling)-2,3-Dibrombutene-(2), Me.CBr : CBr.Me.** — ⟨*⟩ — Adds Br$_2$.
4075	149–50c. (750)	1.685 (17°)	**2-Bromethanol-(1), Glycolbromhydrine, CH$_2$Br.CH$_2$OH.** — ⟨G.O.-E.⟩ — Zn dust in alc. gives C$_2$H$_4$.

No.	Boiling-point (C.°)	Specific Gravity	**“ ADDITIONAL ELEMENT ” — BROMINE. — LIQUIDS.**
4080	149–50	2.317 (21.5°)	**Bromacetyl Bromide, $BrCH_2.CO_2Br$.** — ⟨‡⟩.
4085	150	1.887	**1,2-Dibrombutene-(1), $CH_2Br.CH_2.CBr : CH_2$.** — ⟨*⟩.
4090	154c.	2.061 (16/4)	*α*-**Brompropionyl Bromide, Me.CHBr.COBr.** — ⟨‡⟩— Amide: lft. fr. bz.; m.p. 123°.
4095	154–5		**Dibromisobutylene, $C_4H_6Br_2$.** — ⟨*⟩.
4100	154–5; 148.5–51.5	2.201 (20°)	**s-Dibrommethyl Eth., $(BrCH_2)_2O$.** — ⟨G.O.-E.⟩ — Fumes in air. — Vapor irritating to eyes. — Decd. by aq. to HBr & formic ald.
4105	155–60		**1,2,3,4-Tetrabrom-2-methylbutane, Isoprene Tetrabromide, $CH_2Br.CBrMe.CHBr.CH_2Br$.** — ⟨*⟩ — Thick, stable, nearly odorless liq.
	156.5 th.i.	1.4909 (20/4)	**Brombenzene.** — Cf. No. 4.4690.
4115	158	1.821 (0°)	**2,3-Dibrombutane, Me.CHBr.CHBr.Me.** — ⟨*⟩ — W. 20 vol. aq. & PbO @ 150° gives Me.CO.Et. — Alc.-KOH gives *α*-brom-*α*,*β*-dimethylethylene of b.p. 93.5°.
4120	161		**2,3-Dibrombutane, Me.CHBr.CHBr.Me.** — ⟨*⟩ — (Stereoisomer of b.p. 158°, comp. No. **4**.4115). — Alc-KOH gives *α*-brom-*α*, *β*-dimethylethylene of b.p. 85–6°.
4125	162–3c.	1.524 (0°)	*β*-**Bromethyl Acetate, $Me.CO_2.CH_2.CH_2Br$.** — ⟨G.O.-E.⟩ — Mobile liq. — Taste sweetish burning. — (Warmed w. conc. NaOH sol. gives ethylene oxide.)
4130	163		*α*-**Brom-Isobutyryl Bromide, $Me_2CBr.COBr$.** — ⟨‡⟩ — Corresp. amide: (Dry NH_3 passed into bz. sol.), pr.; m.p. 148°.
4135	163–4	2.708 (20.5°)	**Tribromethene, CHBr : CBr_2.** — ⟨*⟩ — W. Br gives pentabromethane (as also by act. of air, together w. dibromacetic ac.). — Reacts directly with oxygen to give dibromacetyl bromide, $CHBr_2.COBr$. — n_D^t = 1.610553.–.00056788 t.
4140	165 th.i.	1.9238 (18/4)	**Trimethylene Bromide, 1,3-Dibrompropane, $CH_2Br.CH_2.CH_2Br$.** — ⟨*⟩ — (Alc.-KOH gives allyl bromide, etc.) — Heated w. Zn dust + alc. gives trimethylene (C.r. **128**, 437).
4145	168.7c.	1.506 (20/20)	**Ethyl Bromacetate, $CH_2Br.CO_2Et$.** — ⟨G.O.-E.⟩ — Vapors v. irritating to eyes & nose. — n_D^{13} = 1.45420.
4150	170 sl.d.		**Bromacetal, $CH_2Br.CH(OEt)_2$.** — ⟨G.O.-E.⟩ — (Decd. by alc.-KOH).
4155	172–4	1.692 (0°)	**1,2-Dibrom-2-methylbutane, $CH_2Br.CBrMe.CH_2.Me$.** — ⟨*⟩ — Heating w. PbO & aq. gives methylethylacetaldehyde.
4160	174–5	1.829 (0°)	**1,3-Dibrombutane, $CH_2Br.CH_2.CHBr.Me$.** — ⟨*⟩ — w. Zn dust & alc. gives methylcyclopropane.
4165	170–5d.	1.701 (0°)	**2,3-Dibrom-2-methylbutane, $Me_2CBr.CHBr.Me$.** —⟨*⟩ — (Boiled w. alc.-KOH gives Me_2C : CBr.Me) — W. PbO & 20 vol. aq. at 150° gives methylisopropylketone.
4170	174	3.34	**Bromal, $CBr_3.CHO$.** — ⟨G.O.-E.⟩ — Decd. by alk. to $CHBr_3$ & formic ac. — W. H_2O gives cryst. hydrate: m.p. 53.5°.
4175	170–80		**4,4-Dibrom-2-methylbutane, $Me_2.CH.CH_2.CHBr$.**—⟨*⟩— Boiled w. alc.-KOH gives bromamylene, b.p. 110–11°.
4180	177.5–8 (765)	1.821 (20/0)	**1,3-Dibrom-2-methylpropane, $CH_2Br.CHMe.CH_2Br$.** — ⟨*⟩ — Heat partially changes to isobutylene bromide.
4185	178	1.687 (14/0)	**2,3-Dibrompentane, Me.CHBr.CHBr.Et.** — ⟨*⟩.
4190	179–81	253. (0°)	**2,2-Dibromethanol-(1), $CHBr_2.CH_2OH$.** — ⟨G.O.-E.⟩ — D.s. c. aq.; e.s. alc. — Red. ammon. Ag. sol. — (Alc.-KOH dec. to HBr & bromethylene oxide.)
4200	181.5–3.5c.		**Methyl Dibromacetate, $CHBr_2.CO_2Me$.** — ⟨G.O.-E.⟩ — Sapon. gives MeOH.

Explanation of typographical signs used in this Section: * = G.O.-E. & T. 4.7. ‡ = T. 4.11.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENT " — BROMINE. — LIQUIDS.
4205	185–90		**1,3-Dibrom-2,2-dimethylpropane, $CH_2Br.CMe_2.CH_2Br$.** — ⟨*⟩ — W. Zn dust & 70% alc. gives 1,1-dimethyltrimethylene.
4210	185–92 sl.d.	1.584 (20°)	**2,-3Dibrom-2-methylpentane, $Me_2CBr.CHBr.Et$.** — ⟨*⟩ — W. aq. & PbO @ 140° gives ethylisopropylketone.
4215	187	2.6189 17 (5/4)	**1,1,2-Tribromethane, $CH_2Br.CHBr_2$.** — ⟨*⟩ — (Alc.-KOH gives $C_2H_2Br_2$, C_2HBr & C_2H_2.) — Alc.-KĀc. at 150° gives $CH_2 : CBr_2$ smoothly.
4220	183–5; 190–5		**2,3,3-Triblempropene-(1), $CHBr_2.CBr : CH_2$.** — ⟨*⟩ — Adds Br_2 to cryst. comp.
4225	190–1	1.738 (15°)	**1,2-Dibrompentane, $Me.(CH_2)_2.CH_2)_2.CHBr.CH_2Br$.** — ⟨*⟩.
4230	190		**1,2-Dibrompentene-(1), $Pr.CBr : CHBr$.** — ⟨*⟩.
4235	190–1c.	2.33 (12°)	**1,2,2-Tribrompropane, $CH_2Br.CBr_2.Me$.** — ⟨*⟩.
4240	192; 194	1.923 (20/20)	**Ethyl Dibromacetate, $CHBr_2.CO_2Et$.** — ⟨G.O.-E.⟩ — W. aq. ammon. (cooling) gives corresp. amide: ndl.; m.p. 156°. — Sapon. gives EtOH.
4245	194		**Dibromacetyl Bromide, $Br_2CH.COBr$.** — ⟨‡⟩ — Corresp. ac.: deliq.; m.p. 45–50°.).
4250	194–5		**o-Bromphenol, $Br.C_6H_4.OH$.** — ⟨G.O.-D.⟩ — Odor unpleasant, v. persistent. — Fusion w. KOH gives resorcinol (little pyrocatechol). — (Methyl ether: liq.; b.p. 210°, 217°.).
4255	196–8(760)	1.5809 (19/0)	**2,3-Dibromhexane, $Me.CHBr.CHBr.(CH_2)_2.Me$.** — ⟨*⟩ — (Alc.-KOH gives $C_6H_{11}Br$.)
4260	197–8 sl.d.; 198; 194–7	1.79 (18°)	**1,4-Dibrombutane, Tetramethylene Bromide, $CH_2Br.CH_2.CH_2.CH_2Br$.** — ⟨*⟩ — W. Zn dust + alc. gives butane.
4270	204–8 sl.d.		**2,2,3-Tribrombutane, $Me.CBr_2.CBrH.Me$.** — ⟨*⟩ — W. Zn gives brombutylene (b.p. 87–8°).
4275	205–6; 208–15d.	2.0169 (20/4)	**1,1,2-Tribrom-2-methylpropane, $Me_2CBr.CHBr_2$.** —⟨*⟩ — Alc.-NaOH gives dibromisobutylene., b.p. 154–5°.
4280	213–4	1.547 (24.5/0)	**3-Bromcresol-(4), $BrMe.C_6H_3OH$.** — ⟨G.O.-D.⟩ — Liq.
4285	214–18d.	2.136 (17°)	**1,2,2-Tribrombutane, $CH_2Br.CBr_2.Et$.** — ⟨*⟩.
4290	218–19 th.i.	1.570	**Benzoyl Bromide, $C_6H_5.COBr$.** — ⟨‡⟩ — Solidif. at – 24° to cryst. mass., m.p. abt. 0°. — Fumes strongly in air.
4295	219c. sl.d.	2.168 (0°)	**2,3-Dibrompropanol-(1), β-Dibromhydrine, $CH_2Br.CHBr.CH_2$-OH.** — ⟨G.O.-E.⟩.
4300	219d.	2.11 (18°)	**1,3-Dibrompropanol-(2), α-Dibromhydrine, $CH_2Br.CH(OH).CH_2Br$.** — ⟨G.O.-E.⟩ — Distn. gives acrolein (odor)! — B.p. 124° (38 mm.).
4305	219.4 (758)	1.955 (19/4)	**m-Dibrombenzene, $C_6H_4Br_2$.** — ⟨*⟩ — M.p. = + 1 to 2°.
4310	218–22 (760)	2.436 (23°)	**1,2,3-Tribrompropane, Tribromhydrine, $CH_2Br.CHBr.CH_2Br$.** — ⟨*⟩ — M.p. 16–17°. — (Alc.-KOH gives ethylpropargylether.)
4315	221; 220–2 (sl.d.); 223–4	1.706 (18°)	**1,5-Dibrompentane, Pentamethylene Bromide, $CH_2Br.(CH_2)_3.CH_2Br$.** — ⟨*⟩ — Odor aromatic. — M.p. – 35°. — Warmed w. Zn dust + alc. gives pentamethylene.
4320	215–30d.	2.653 (18/0)	**1,2,2,3-Tetrabrompropane, $CH_2Br.CBr_2.CH_2Br$.** — ⟨*⟩ — Odor camphorous. — Zn dust & alc. gives s-allylene.
4325	220–25		**Tribromacetyl Bromide, $Br_3C.COBr$.** — ⟨‡⟩.
4330	223.8 (752)	2.003 (0°)	**o-Dibrombenzene, $C_6H_4Br_2$.** — ⟨*⟩ — M.p. = – 1°.
4335	225	2.230 (20/20)	**Ethyl Tribromacetate, $CBr_3.CO_2Et$.** — ⟨G.O.-E.⟩ — Sapn. gives EtOH.
4340	226	2.469	**Dibrompropylene Bromide, (fr. Propylene Bromide & Br), $C_3H_4Br_4$.** — ⟨*⟩.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENT " — BROMINE. — LIQUIDS.
4345	225–30d.	2.94 (0°)	**1,1,2,2-Tetrabrompropane,** $CHBr_2.CBr_2.CH_3$. — ⟨*⟩ — Alc.-KOH gives $C_3H_3Br_3$(b.p. 190–5°).
4350	236	1.813 (19°)	**2,5-Dibromtoluene,** $Br_2.C_6H_3Me$. — ⟨*⟩ — St. liq. @ – 20°. — Several days boiling w. dil. HNO_3 gives 2,5-dibrombenzoic ac.
4355	239–41 sl.d.		**1,6-Dibromhexane,** $CH_2Br.(CH_2)_4.CH_2Br$. — ⟨*⟩ — W. Na gives cyclohexane.
4360	239–41	1.812 (19°)	**3,4-Dibromtoluene,** $Br_2.C_6H_3Me$. — ⟨*⟩ — Not solid @ – 20°. — Oxid. by CrO_3 in gl. ac.ac. to 3,4-dibrombenzoic ac.
4365	245		**s-Dibromacetic Anhydr.,** $(CH_2Br.CO)_2.O$. — ⟨G.O.-E.⟩ — W. aq. gives bromacetic ac., No. 4.370.
4370	246	1.812 (22°)	**2,6-Dibromtoluene,** $Br_2.C_6H_3Me$. — ⟨*⟩ — Not solid @ – 20°.
4375	250–6d.		**Diethyl Dibrommalonate,** $CBr_2.(CO_2Et)_2$. — ⟨G.O.-E.⟩ — Alc.-NH_3 gives diamide: ndl.; alm. i. c. aq.; m.p. 206° d. – Sapn. gives EtOH.
4380	254–6 sl.d.		**1,7-Dibromheptane,** $CH_2Br.(CH_2)_5.CH_2Br$. — ⟨*⟩.
4385	269 th.i.		**2,4-Dibrom-1,3-dimethylbenzene** $Br_2.C_6H_2Me_2$. — ⟨*⟩ — M.p. – 8°.
4390	270–1d.		**1,8-Dibromoctane,** $CH_2Br.(CH_2)_6.CH_2Br$. — ⟨*⟩ — M.p. 15–16°. — B.p. 150–61° (20–25).
4395	272	1.596 (14°)	**2,5-Dibrom-1-methyl-4-isopropylbenzene,** $Br_2.C_6H_2.Me,C_3H_7$. — ⟨*⟩.
4400	275		**1,1,2,2-Tetrabrom-2-methylbutane,** $Me(CH_2)_2.CBr_2.CHBr_2$. — ⟨*⟩.
4405	277	1.784 (15°)	**3,4-Dibrom-1,2-dimethylbenzene,** $Br_2.C_6H_2.Me_2$. —⟨*⟩— Cryst. — M.p. 6.8°.
4410	285–8d.		**1,9-Dibromnonane,** $CH_2Br.(CH_2)_7.CH_2Br$. — ⟨*⟩ — B.p. 171–3° (20–25 m.m.) — Splits off HBr on distn.

Explanation of typographical signs used in this Section; * = G.O.-E. & T. 4.7. ‡ = T. 4.11.

ANALYTICAL TABLES

OF

ORDER IV

COMPOUNDS CONTAINING BROMINE AS "ADDITIONAL ELEMENT"

DIVISION B, LIQUID SPECIES.

SECTION 2. WITH SPECIFIC GRAVITY LOWER THAN 1.50

No.	Boiling-point (C°.)	Specific Gravity	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
4500	38.4	1.450 (15°)	**Ethyl Bromide, EtBr.** — ⟨*⟩ — M.p. − 116°. — Odor sweetish, ethereal. — Ppts. AgBr fr. h. alc. $AgNO_3$ sol. — Convert to ethyl dinitrobenzoate, m.p. 92°. — 3°, uncor., by T.**4**.7a.
4505	47–8 (742)	1.362 (20°)	**2-Brompropene-(1), CH_2 : CBr.Me.** — ⟨*⟩ — Boiled w. alc.-KOH gives allylene. — Adds HBr easily in cold to bromacetale.
4510	60 (th.i.)	1.3097 (20/4) 1.9333 (20/4)	**2-Brompropane, Isopropyl Bromide, Me.CHBr.Me.** — ⟨*⟩.
4515	59.5–60 (740)	1.428 (19.5°)	**1-(Iso-α-)Brompropene, CHBr : CHMe.** —⟨*⟩ — n_D = **1.45536** — Alc.-KOH gives allylene.
4520	63–4		**1-Brompropene-(1), MeCH : CHBr.** — ⟨*⟩ — **Alc.-KOH dec.** more slowly than steroisomer of b.p. 59.5–60°.
4525	72	1.202 (15°)	**tert-Butyl Bromide, Me_3.CBr.** — ⟨*⟩.
4530	71c.	1.3520 (20/4)	**Propyl Bromide, Et.CH_2Br.** — ⟨*⟩.
4535	70–71	1.398 (20/4)	**Allyl Bromide,CH_2:CH.CH_2.Br.** — ⟨*⟩ — n_D^{20} = **1.46545.**
4540	76 (750)	1.461 (0°) 1.52 (9.5°)	**Acetyl Bromide, Me.COBr.** — ⟨‡⟩ — **Fumes strongly in air.**
4545	83.5–84.5	1.3152 (26/4)	(cis)-**2-Brombutene-(2), Me.CBr : CH.Me.** — ⟨*⟩ — Partially changed to trans-comp., b.p. 92–3°, by light in presence of traces of HBr. — (Alc.-KOH splits off HBr easily.)
4550	88	1.28 (21°)	**2-Brombutene-(1), CH_2 : CBr.Et.** — ⟨*⟩.
4555	91; 89–92; 98–9	1.354 (0°)	**1-Brom-2-methylpropene, Isocrotyl Bromide, CHBr : CMe_2.** — ⟨*⟩ — Moist Ag_2O @ 100° gives isobutyric ac.
4560	92.3c.; 90.5–91 (758)	1.272 (15°) 1.204 (16°)	**Isobutyl Bromide, Me_2.CH.CH_2Br.** — ⟨*⟩ — T.**4**.7a. gives isobutyl 3,5-dinitrobenzoate: nearly colorless cryst. fr.h. dil. (2:1) alc.; m.p. 83° (uncor.).
4565	92–4c.	1.416 (0/4)	**1-Brombutadiene-(1,3), CH_2 : CH.CH : CHBr.** — ⟨*⟩ — Odor like vinyl bromide. — Misc. alc., eth., pet.-eth. — Unstable. — Adds 4 Br.
4570	93–4	1.321 (26/4)	**(Higher-boiling) 2-Brombutene-(2), Me.CH : CBr.Me.** — ⟨*⟩ — Odor agreeable. Repeated distn. changes to isomer, b.p. 84°. — (1 hr. heating w. 1 mol. 15% alc.-KOH dec. compl. to HBr & dimethylacetylene).

No.	Boiling-point (C.°)	Specific Gravity	"ADDITIONAL ELEMENT" — BROMINE. — LIQUIDS.
4575	99.9c.; 101.4 (744)	1.305 (0°)	**n-Butyl Bromide, Et.CH$_2$.CH$_2$Br.** — ⟨*⟩ — T.4.7a. gives n-butyl 3,5-dinitrobenzoate: nearly colorless cryst. fr.h.dil. (2 : 1) alc.; m.p. 64° (uncor.).
4580	102–3	1.312 (0°)	**1-Brombutene-(2), Crotyl Bromide, Me.CH : CH.CH$_2$Br.** — ⟨*⟩ — W. Zn dust gives octadiene-(2,6).
4585	104c.	1.52 (9.5°)	**Propionyl Bromide, Et.COBr.** — ⟨‡⟩.
4587	104	1.3720 (4°)	**Bromcyclobutane, $^{\ulcorner}$CHBr.(CH$_2$)$_2$.CH$_2$$^{\urcorner}$.** — ⟨*⟩.
4590	108–9d.	1.244 (0/0)	**2-Methyl-2-brombutane, tert-Amyl Bromide, Me$_2$CBr.Et.** — ⟨*⟩ — Odor ethereal.
4595	108–9d.	1.225 (0°)	**1-Brom-2, 2-dimethylpropane, CH$_2$Br.CMe$_3$.** — ⟨*⟩.
4600	113		**2-Brompentane Me.CHBr.(CH$_2$)$_2$.Me.** — ⟨*⟩.
4605	114–6		**3-Brom-2-methylbutane, Me$_2$.CH.CHBr.Me.** — ⟨*⟩.
4610	116–8		**Isobutyryl Bromide, Me$_2$.CH.COBr.** — ⟨‡⟩ — Corresp. amide: tbl. fr. bz.; m.p. 129°.
4620	118.6 (760)	1.236 (0°)	**Isoamyl Bromide, 2-Methyl-4-brombutane, Me$_2$.CH.CH$_2$.CH$_2$-Br.** — ⟨*⟩.
4625	116.5–18c. 117–20 (754)	1.225 (15°) 1.222 (15.7°)	**act.-Amyl Bromide, 1-Brom-2-methylbutane, CH$_2$Br.CHMe.Et.** — ⟨*⟩.
4630	117	1.242 (20°)	**1-Brom-2-methylbutene-(1), Et.CMe : CHBr.** — ⟨*⟩.
4635	128		**Butyryl Bromide, Et.CH$_2$.COBr.** — ⟨‡⟩.
4640	128.7 (739)	1.246 (0°)	**n-Amyl Bromide, 1-Brompentane, C$_5$H$_{11}$Br.** — ⟨*⟩.
4645	133–4		**3-Brombutanone-(2), Me.CO.CHBr.Me.** — ⟨G.O.-E.⟩ — I. aq. — Irritates mucous membrane.
4650	142–5c. (748)		**1-Brom-2-methylpentane, CH$_2$Br.CHMe.(CH$_2$)$_2$.Me.** — ⟨*⟩ — W. aq. at 150° gives hexene.
4655	143–5		**2-Bromhexane, Me.CHBr.(CH$_2$)$_3$.Me.** — ⟨*⟩.
4660	144d.		**Methyl Bromacetate, CH$_2$Br.CO$_2$Me.** — ⟨G.O.-E.⟩ — Sapon. gives MeOH.
4665	143–5; 146–7	1.168 (20°)	**5-Brom-2-methylpentane, Me$_2$CH.CH$_2$.CH$_2$Br.** — ⟨*⟩ — Odor faint.
4670	145		**Bromacetaldehydedimethylacetale, CH$_2$Br.CH(OMe)$_2$.** — ⟨G. O.-E.⟩.
4675	145–6		**1-Brombutanone-(2), CH$_2$Br.CO.Et.** — ⟨G.O.-E.⟩ — I. aq. — Vapors irritate mucous membrane.
4680	145–8		**1-Brompropanol-(2), CH$_2$Br.CH(OH).Me.** — ⟨G.O.-E.⟩.
4685	155.5 (744)	1.194 (0°)	**1-Bromhexane, CH$_2$Br.(CH$_2$)$_4$.Me.** — ⟨*⟩.
4690	156.6 th.i. 162	1.4991 (15/15) 1.4909 (20/4)	**Brombenzene, C$_6$H$_5$Br.** — ⟨*⟩ — M.p. − 30.5°c. — (Stable on protracted boiling w. alc.-KOH).
4695		1.392 (26/20)	**Ethyl α-Brompropionate, Me.CHBr.CO$_2$Et.** — ⟨G.O.-E.⟩ — Sapon. gives EtOH.
	162–3c.	1.524 (0°)	**β-Bromethyl Acetate.** — Cf. No.4.4125.
4710	163.6c.	1.329 (20/20)	**Ethyl α-Bromisobutyrate, Me$_2$CBr.CO$_2$Et.** — ⟨G.O.-E.⟩ — Sapon. gives EtOH.
4715	165		**1-Bromheptene-(1), Me.(CH$_2$)$_4$.CH : CHBr.** — ⟨*⟩.
4720	165–7 sl.d.	1.422.(17.5°)	**2-Bromheptane, Me.CHBr.(CH$_2$)$_4$.Me.** — ⟨*⟩ — (NaOEt gives heptene).
4725	168.7c.	1.506 (20/20)	**Ethyl Bromacetate, CH$_2$Br.CO$_2$Et.** — ⟨G.O.-E.⟩ — Vapors v. irritating to eyes & nose. — n$_D$^{13} = 1.45420. — Sapon. gives EtOH.
4730	170 sl.d.		**Bromacetale, BrCH$_2$.CH(OEt)$_2$.** — ⟨G.O.-E.⟩ — (Decd. by alc.-KOH.)

Explanation of typographical signs used in this Section: * = G.O.-E. & T. 4.7. ‡ = T. 4.11.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENT " — BROMINE. — LIQUIDS.
4735	178c.	1.324 (25/25)	**Ethyl d,l-α-Brombutyrate, Et.CHBr.CO$_2$Et.** — ⟨G.O.-E.⟩ — (Corresp. ac. m.p. – 4° decd. by alk.) — Sapon. gives EtOH.
4740	179 (760)	1.133 (16°) 1.1577 (0/4)	**1-Bromheptane, CH$_2$Br.(CH$_2$)$_5$.Me.** — ⟨*⟩ — Boiled 25 hrs. w. 1 pt. KOH disd. in alc. gives mainly Et.O.C$_7$H$_{15}$.
4742	180.3 (754)	1.422 (20/4) 1.431 (15/15)	**o-Bromtoluene, Br.C$_6$H$_4$.Me.** — ⟨*⟩ — M.p. – 26°. — Oxidn. by dil. HNO$_3$ gives o-brombenzoic ac. (CrO$_3$ gives no acid.)
4745	184 (760)	1.201	**m-Bromtoluene, Br.C$_6$H$_4$Me.** — ⟨*⟩ — M.p. – 40°. — CrO$_3$ mixt. oxid. to m-brombenzoic ac.
4750	188–9	1.296	**2-Bromhexanol-(3), Me.(CH$_2$)$_2$.CH(OH).CHBr.Me.** — ⟨G.O.-E.⟩
4755	188 (741); 191	1.099 (22°)	**2-Bromoctane, CH$_2$Br.(CH$_2$)$_6$.Me.** — ⟨*⟩.
4760	198–9	1.438 (22/2)	**Benzyl Bromide, C$_6$H$_5$.CH$_2$Br.** — ⟨*⟩ — Strong lachrymator. — T.**4**.7a. probably gives benzyl 3,5-dinitrobenzoate: hair-like ndl. fr. h. 95% alc.; m.p. 113° (uncor.).
4765	202–4 th.i.		**o-Bromethylbenzene, Br.C$_6$H$_4$.Et.** — ⟨*⟩ — St. liq. @ – 20°. — Oxidn. w. KMnO$_4$ gives o-brombenzoic ac.
4770	199; 204	1.34 (13.5°)	**p-Bromethylbenzene, Br.C$_6$H$_4$.Et.** — ⟨*⟩ — St. liq. @ – 20°.
4775	203–4; 205		**4-Brom-1,3-dimethylbenzene, Br.C$_6$H$_3$Me$_2$.** — ⟨*⟩ — Oxidn. by CrO$_3$ mixt. gives brom-m-toluic ac.
4780	204	1.362 (20°)	**5-Brom-1,3-dimethylbenzene, Br.C$_6$H$_3$Me$_2$.** — ⟨*⟩ — St. liq. @ – 20°.
4785	203–4c.; 198–200; 200.3–202–3 th.i.	1.116 (16°) 1.118 (15°) 1.118 (13°)	**1-Bromoctane, CH$_2$Br.(CH$_2$)$_6$.Me.** — ⟨*⟩.
4790	205–7c. (741)		**2-Bromisopropylbenzene, Br.C$_6$H$_4$.C$_3$H$_7$.** — ⟨*⟩.
4795	205.5 (th.i.; 755); 200		**2-Brom-1,4-dimethylbenzene, Br.C$_6$H$_3$.Me$_2$.** — ⟨*⟩ — Oxidn. by CrO$_3$ in gl.ac.ac. gives brom-p-toluic ac.
4800	206		**2-Brom-1,3-dimethylbenzene, Br.C$_6$H$_3$.Me$_2$.** — ⟨*⟩ — St. liq. at – 10°.
4802	208–9d.	1.081 (20°)	**2-Bromnonane, Me.(CH$_2$)$_6$.CHBr.Me.** — ⟨*⟩ — n = 1.45357.
4805	212–15 sl.d.	1.371 (23°)	**1^1-Brom-1,3-dimethylbenzene, Me.C$_6$H$_4$.CH$_2$Br.** — ⟨*⟩.
4810	214.5 th.i.	1.369 (15°)	**4-Brom-1,2-xylene, Br.C$_6$H$_3$Me$_2$.** — ⟨*⟩ — M.p. – 0.2°. — Oxidn. w. dil. HNO$_3$ gives brom-o-toluic ac.
4815	215–6 (716)		**m-Brombenzaldehyde, Br.C$_6$H$_4$.CHO.** — ⟨G.O.-E.⟩ — Solid. in freezing mixt. — Vol. w. st.
4820	216–7 (742)	1.381 (23°)	**o-Xylyl Bromide, Me.C$_6$H$_4$.CH$_2$Br.** — ⟨*⟩ — M.p. 21°.
4825	216c.; 217	1.301 (15°)	**4-Bromisopropylbenzene, Br.C$_6$H$_4$.C$_3$H$_7$.** — ⟨*⟩ — Boiled w. HNO$_3$ (sp.gr. 1.2) gives p-brombenzoic ac. — (KMnO$_4$ does *not* attack readily.)
4830	220c.		**4-Brompropylbenzene, Br.C$_6$H$_4$.Pr.** — ⟨*⟩ — Oxidn. by dil. HNO$_3$ gives p-brombenzoic ac.
4835	220	1.429 (19/0)	**1^2-Bromstyrene, Ph.CH : CBr$_2$.** — ⟨*⟩ — Odor like hyacinths. — Heated w. 3 mol. KOH & alc. gives phenylacetylene.
4840	221–3 th.i.		**2-Brom-1-propylbenzene, Br.C$_6$H$_4$.Pr.** — ⟨*⟩ — St. liq. @ – 20°.
4842	223c.	1.494 (9°)	**p-Bromanisole, Br.C$_6$H$_4$.OMe.** — ⟨G.O.-E.⟩ — Solidif. in freezing mixt. — M.p. + 9–10°.
4845	225	1.319 (10°)	**Brom-1,3,5-trimethylbenzene, Br.C$_6$H$_2$.Me$_3$.** — ⟨*⟩ — M.p. – 1°.
4850	226–9		**3-Brom-1,2,4-trimethylbenzene, Br.C$_6$H$_2$.Me$_3$.** — ⟨*⟩ — St. liq. @ – 25°.
4852	227–33; 233.		**p-Bromphenetole, Br.C$_6$H$_4$.OEt.** — ⟨G.O.-E.⟩ — M.p. + 4°.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENT " — BROMINE. — LIQUIDS.
4855	237-8 th.i.		**3-Brom-1-methyl-4-isopropylbenzene, $Br.C_6H_3.Me.C_3H_7$.** — ⟨*⟩.
	230		**o-Brombenzaldehyde.** — Cf. No. **4**.110; m.p. 21-2°.
4865	233-5 th.i.	1.269 (17.5°)	**2-Brom-1-methyl-4-isopropylbenzene, $Br.C_6H_3.Me,C_3H_7$.** —⟨*⟩.
4870	252-4		**4-Brom-1,2,3,5-tetramethylbenzene, $Br.C_6H.Me_4$.** — ⟨*⟩ — Solidifies to leafy mass in freezing mixt.
4875	279.5 th.i. (753)	1.489 (16.5°)	**1-(α)-Bromnaphthalene,** $C_{10}H_7Br$. — ⟨*⟩ — M.p. + 4-5°. — Misc. w. abs. alc., eth., bz. — (*Not* at. by alc.-KOH.) — Na amalgam red. to naphthalene in alc. sol. — Oxidn. by CrO_3 in gl. ac.ac. gives phthalic ac. — Picrate: lemon yel. ndl. fr. bz.; m.p. 134-5°; s. in 18 pt. c. 92% alc.
4880	284		**Brom-1,2,3,4-tetraethylbenzene, $Br.C_6HEt_4$.** — ⟨*⟩ — Liq.
4885	285-90		**Bromoctylbenzene, $Br.C_6H_4.C_8H_{17}$.** — ⟨*⟩ — St. liq. @ − 10°.
4890	296-8		**o-Brombiphenyl, $Br.C_6H_5.Ph$.** — ⟨*⟩ — St. liq. @ − 20°. — Odor like oranges. — CrO_3 oxidn. gives o-brombenzoic ac.

CHAPTER V

ORDER V

COMPOUNDS CONTAINING IODINE AS "ADDITIONAL ELEMENT"

GENERAL OBSERVATIONS

(**A**) **Color** (T. **4**.1). — Many species in this order that are colorless when pure have a marked tendency to decompose with darkening on standing and exposure to light. Color is also noted in the case of some species having a very high iodine content that do not have quinonic structure. Thus iodoform (CHI_3) and tetraiodethylene ($CI_2:CI_2$) are lemon yellow, while tetraiodmethane (CI_4) is dark red, and hexaiodbenzene (C_6I_6) is red-brown.

(**B**) **Divisions.** — *Division A* contains all species that are solid at room temperature and is not subdivided.

Division B contains all species that are liquid at room temperature and is not subdivided, although the contrasts that will be noted on inspecting the column showing specific gravities (T. **4**.2) in the Tables will be found striking and helpful.

(**C**) **Odor**; (**D**) **Acidity**; (**E**) **Behavior Toward Hot Alkali Solution**; (**F**) **Reactivity Towards Silver Solution.** — The remarks made concerning chlorine compounds of Order III at the beginning of Chapter III under the corresponding letters in "General Observations" are equally applicable to the iodine compounds of Order V, except that in tests involving reactivity of the halogen atom it is to be remembered that iodine is often much more easily replaced by other elements and radicals than is chlorine or bromine when similarly situated.

ANALYTICAL TABLES

OF

ORDER V

COMPOUNDS CONTAINING IODINE AS "ADDITIONAL ELEMENT"

DIVISION A, SOLID SPECIES.

No.	Melting-point (C°.)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	−4	**Methyl Iodide Hydrate, $(MeI)_2 + H_2O$.** — Cryst.
55	5.8	**1,4-Diiodbutane, $CH_2I.CH_2.CH_2.CH_2I$.** — ⟨*⟩ — B.p. 125–6°d. (15 mm.) — Sp. gr. = 2.307 (18°).
60	6–7	**1,6-Diiodhexane, $CH_2I.(CH_2)_4.CH_2I$.** — ⟨*⟩ — E. vol. w. st.
65	+9	**1,5-Diiodpentane, $CH_2I.(CH_2)_3.CH_2I$.** — ⟨*⟩ — B.p. 149° (20 mm.), 135–6° (12 mm.). — Sp. gr. = 2.194 (18°).
70	22	**Cetyl Iodide, $C_{16}H_{33}I$.** — ⟨*⟩ — B.p. 211°c. (15mm.), 128° (0 mm.). — Leafy cryst. — Ⓓ T. **4.**7a gives cetyl 3,5-dinitrobenzoate: white powd. w. waxy feel fr. h. 95% alc.; m.p. 66°–67° (uncor.).
75	24.1	**Benzyl Iodide, $C_6H_5.CH_2I$.** — ⟨*⟩ — Compl. decd. by boiling. — Powerful lachrymator! — Sp. gr. = 1.7335 (25°). — D.s. CS_2 @ 0° — W. $AgNO_2$ gives benzaldehyde & benzoic ac. — T. **4.**7a probably gives benzyl 3,5-dinitrobenzoate: nearly colorless hair-like ndl. fr. h. 95% alc.; m.p. 113° (uncor.).
80	26	**1,1,2-Triiodbutene-(1), $Me.CH_2.CI:CI_2$.** — ⟨*⟩ — Cryst. — Sensitive to light.
85	27	**o-Diiodbenzene, $C_6H_4I_2$.** — ⟨*⟩ — B.p. 286.5° (th.i.). — Pr. or tbl.
90	30	**1^2-Iodacetophenone, Phenacyl Iodide, $Ph.CO.CH_2I$.** — ⟨§⟩ — Odor pungent, irritating! — Vol. at ord. temp. — Separates iodine in sunlight. — Ndl. — I. aq.; s. org. solv. — (V. reactive I.)
95	30.5	**2-Iod-1,3,5-trimethylbenzene, $I.C_6H_2.Me_3$.** — ⟨*⟩ — B.p. 248–50°. — Ndl. — Vol. w. st.
100	33.5; 42–43	**Octadecyl Iodide, $C_{18}H_{37}I$.** — ⟨*⟩ — Lft. fr. lgr. — D.s. c. alc.
105	35	**p-Iodtoluene, $I.C_6H_4.Me$.** — ⟨*⟩ — B.p. 211.5°. — Lft. — In chlf. sol. w. Cl_2 gives dichloride: ndl., decg. @ 85°.
110	36	**β-Iodisobutyric Ac., $CH_2I.CHMe.CO_2H$.** — ⟨T. **4.**3a⟩ — Tbl. fr. CS_2. — D. s. aq.
115	37	**o-Iodbenzaldehyde, $I.C_6H_4.CHO$.**
120	37	**Iod-1,3,4-trimethylbenzene, $I.C_8H_2.Me_3$.** — ⟨*⟩ — B.p. 256–8°. — C. sat. chlf. sol. w. Cl gas gives ppt. of yel. cryst. dichloride, decg. @ 40°.
125	40–1	**γ-Iodbutyric Ac., $CH_2I.CH_2.CH_2.CO_2H$.** — ⟨‡⟩ — Cryst. — D.s. c. aq.
130	40	**m-Iodphenol, $I.C_6H_4.OH$.** — ⟨‡⟩ — Ndl. fr. lgr.
135	40.4; 36.5	**m-Diiodbenzene, $C_6H_4I_2$.** — ⟨*⟩ — B.p. 284.7 (756 mm.). — Rhomb. tbl. fr. eth. + alc.

Explanation of typographical signs used in this Division: * = T. 4.7. ‡ = G.O.-D. § = G.O.-E.

No.	Melting-point (C°.)	"ADDITIONAL ELEMENT" — IODINE. — SOLIDS.
140	40–1	**1,2,3-Triiodpropene, $CHI : CI.CH_2I$.** — ⟨*⟩ — Ndl. — D.s. eth.; e.s. CS_2.
145	41–2	*α*-**Iodbutyric Ac., $Et.CHI.CO_2H$.** — ⟨‡⟩ — Ndl. — D.s. aq.; e.s. alc., eth., pet.-eth.
150	41.5	**2,3-Diiodbutene-(2), Me.CI : CI.Me.** — ⟨*⟩ — B.p. 111° (22 mm.). — Tbl.
155	43	**o-Iodphenol, $I.C_6H_4.OH$.** — ⟨‡⟩ — B.p. 186–7° (160 mm.). — Dec. on distn. at ord. pressure. — Ndl. — E.s. alc., eth., CS_2; mod. s. h. aq. — Warmed w. HNO_3 (sp. gr. 1.2) gives picric ac., No. **3**.3168. — Fusion w. KOH gives pyrocatechol.
160	44	**2,5-Diiodhexane** (solid modif.), **$Me.CHI.(CH_2)_2.CHI.Me$.** — ⟨*⟩ — B.p. 134° (15 mm.). — Alc.-KOH gives dipropenyl, C_6H_{10}.
165	45d.	**2,3-Diiodpropanol-(1), Allyl Alc. Diiodide, $CH_2I.CHI.CH_2.OH$.** — ⟨§⟩ — I. aq.; e.s. alc., eth., chlf., bz.
170	45.5c.	*α*-**Iodpropionic Ac., $Me.CHI.CO_2H$.** — ⟨§⟩ — Ndl. — D.s. aq.; e.s. org. solv., excepting pet.-eth.
175	49	**Iodostarin, Tairinic Ac. Diiodide, $Me.(CH_2)_{10}.CI : CI.(CH_2)_4.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Lust. colorless scales. — I. aq.; d.s. c. alc.; e.s. h. alc., eth., bz. — Gives red-violet color w. c. conc. H_2SO_4, I separating rapidly on warming.
180	49	**Diiodacetic Anhydr., $(CH_2I.CO)_2O$.** — Cryst. — V.d.s. c. aq., alc.; e.s. chlf., eth. — Becomes opaque on keeping.
185	50–1	**Behenolic Ac. Diiodide, $Me.(CH_2)_7.CI : CI.(CH_2)_{11}.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Ndl. fr. alc. — E.s. h. alc.; d.s. c. — (H. alc-KOH does not remove all the I. Stable in light.).
190	51	**Palmitolic Ac. Diiodide, $Me.(CH_2)_7.CI : CI.(CH_2)_5.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Cryst. fr. alc.
195	52 r.h.	**Iodnonylene, Campholene Hydroiodide, $C_9H_{17}I$.** — ⟨§⟩ — Cryst. powd. — KOH gives isocampholene.
200	52–5	**x-Iodsalicylic Ald., $I.C_6H_3(OH)(CHO)$.** — Cryst. fr. lgr. — E.s. Na_2CO_3.
205	54.5	**2-(*β*)-Iodnaphthalene, $C_{10}H_7I$.** — ⟨*⟩ — Lft. — Vol. w. st. — V.s. alc., eth., gl.ac.ac.
212	56–7	**s-Iodvalerianic Ac., $CH_2I.(CH_2)_3.CO_2H$.** — ⟨‡⟩ — Pr. fr. lgr. — Darkens @ 135°.
213	57	*α*-**Iodpalmitic Ac., $Me.(CH_2)_{13}.CHI.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Lft. fr. lgr. — D.s. c. alc.; s. h. alc., chlf., lgr. — (Alc.-KOH removes I.)
215	57	**m-Iodbenzaldehyde, $I.C_6H_4.CHO$.** — Pr. fr. dil. alc. — Cl passed into 1 g. in 10 c.c. chlf. sol. gives yel. cryst. of $C_7H_5O.ICl_2$.
217	59.5–60.5	**Angelic Ac. Hydroiodide, $Me.CHI.CHMe.CO_2H$.** — ⟨‡⟩ — 100 pt. aq. @ 200° dis. 1.49 pt.; 100 pt. pet.-eth. @ 22° dis. 21.1 pt. — Warmed w. Na_2CO_3 sol. gives *α*,*β*-dimethylethylene, b.p. + 2.5°. — ($AgNO_3$ sol. removes I.)
220	61.5–2.5; 65–6	**s-Diiodacetone, $(CH_2I)_2.CO$.** — ⟨§⟩ — Colorless, "odorless," "pungent smelling" ndl. — E.s. eth., bz., acetone; d.s. chlf., CS_2. — Reduced to acetone (Vol. I) by Zn & ac.ac.
225	64	**1,1,2-Triiodpropene-(1), $Me.CI : CI_2$.** — ⟨*⟩ — Ndl. — Dec. in light and at 78°. — V.s. eth.; s. alc. — W. powd. KOH gives *α*-iodallylene.
230	67	**Iodresorcinol, $I.C_6H_3(OH)_2$.** — ⟨‡⟩ — Pr.
232	69	**6-Iodthymol, $I.C_6H_2.Me(C_3H_5)(HO)$, ($Me : C_3H_5 : HO = 1 : 4 : 3$).** — Lust. ndl. — E.s. alc. — $FeCl_3$ gives thymoquinone. — Fuming HNO_3 gives nitrothymol.
235	69.5	**Diiodcresol-(2), $I_2.C_6H_2.(OH)(Me)$.** — ⟨‡⟩ — Ndl. — E.s. alc.
240	69.5	**Myricyl Iodide, $C_{30}H_{61}I$.** — ⟨*⟩ — Lft.
245	70	*α*-**Iodarachidic Ac., $Me.(CH_2)_{17}.CHI.CO_2H$.** — ⟨T. **4**.3a in alc.⟩ — Mic. pr. fr. alc.
250	71.8	**p-Iodbenzyl Alc., $I.C_6H_4.CH_2OH$.** — ⟨§⟩ — Scales. — Odor aromat. — D.s. aq.; e.s. alc., eth., bz., CS_2.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — IODINE. — SOLIDS.
255	72	**2,4-Diiodphenol, $I_2.C_6H_3.OH$.** — ⟨‡⟩ — Fine ndl. fr. aq. — Boiled w. HNO_3 (sp. gr. 1.3) gives picric ac. (No. **2**.3168).
260	73	("**trans**")-**1,2-Diiodethene, CHI : CIH.** — ⟨*⟩ — B.p. 192° c. — Vol. w. st. or alc. — Odor intense, charact., not unpleasant. — Monoclin. pr. fr. alc. — Sp. gr. 3.303 (21°). — Alc.-KOH gives acetylene (Vol. I) at once. — Cf. Ann. **298**, 343 for other reactions.
265	73.5	**α-Iodisobutyric Ac., $Me_2CI.CO_2H$.** — ⟨‡⟩ — Pr. — S. aq., alc., eth. — Unstable in light.
270	76	**1,2,4-Triiodbenzene, $C_6H_3I_3$.** — ⟨*⟩ — Sm. ndl. — Sbl.
275	76	**$1^1,1^2$-Diiodstyrene, Ph.CI : CHI.** — ⟨*⟩ — Lft. fr. alc. — E.s. alc. — Heated w. Zn dust + alc. gives phenylacetylene (Vol. I).
280	77	**p-Iodbenzaldehyde, $I.C_6H_4.CHO$.**
285	abt. 78	**Periodacetone, $(CI_3)_2.CO$.** — Light yel. cryst. powd. — Decd. by most solvents. — Dil NaOH sol. gives iodoform (No. **5**.420).
290	79	**p-Iodacetophenone, $I.C_6H_4.CO.Me$.** — Cryst. fr. eth. — Oxid. by CrO_3 & gl.ac.ac. to p-iodbenzoic ac. (No. **5**.657).
295	80	**3-Iod-1,2,4,5-tetramethylbenzene, $I.C_6H.Me_4$.** — ⟨*⟩ — B.p. 285–90°. — Cryst. fr. bz.
300	81; 82; 78	**Diiodacetylene, CI : CI.** — ⟨*⟩ — Ndl. fr. lgr. — V. volat. — Skin irritant. — Toxic. — Odor offensive. — Sbl. on water-bath without residue. — At 80–100° explodes violently giving I and C. — Cl gives hexachlorethane. — Polym. in light.
305	81	**1,2-Diiodnaphthalene, $C_{10}H_6I_2$.** — Scales fr. alc.
310	81–2	**1,2-Diodethane, Ethylene Iodide, $CH_2I.CH_2I$.** — ⟨*⟩ — Sp. gr. 2.132 (10°). — Pr. or tbl. — E. decd. by heat.
315	82	**β-Iodpropionic Ac., $CH_2I.CH_2.CO_2H$.** — ⟨‡⟩ — Glassy lft. — D.s. c.; e.s. h. aq.; v.s. alc., eth. — $AgNO_3$ ppts. AgI at once fr. aq. sol. — Decd. by boiling w. much aq. — (Esters liq.).
320	82–3	**2,4-Diiod-1,3,5-trimethylbenzene, $I_2.C_6H.Me_3$.** — ⟨*⟩ — Ndl. fr. alc.
325	83	**Iodacetic Ac., $CH_2I.CO_2H$.** — ⟨‡⟩ — Colorless rhomb. tbl. — Action on skin v. caustic. — (Esters liq. & of v. irritating odor, lachrymatory). — $Pb\bar{A}_2$: pr.; decd. to PbI_2 & glycollic ac. by boiling w. aq.
327	86.5–7	**(higher-melting) Tiglic Ac. Hydroiodide, $Me.CHI.CHMe.CO_2H$.** — ⟨‡⟩ — Lft. fr. pet.-eth. — 100 pt. aq. dis. 0.64 pt. @ 20°; 100 pt. pet.-eth. dis. 3.1 pt. @ 22°. — Heated w. Na_2CO_3 sol. gives α,β-dimethylethylene: b.p. + 1.5°. — $AgNO_3$ sol. (T. **4**.5) removes all I.
330	93–4; 92	**p-Iodphenol, $I.C_6H_4.OH$.** — ⟨‡⟩ — Dec. on distn. — Flat ndl. fr. aq. — Vol. w. st. — E.s. alc., eth. — Boiled w. HNO_3 gives picric ac. — Fusion w. KOH gives hydroquinone at lower, and resorcinol at higher temp.
335	94.5	**1-Iodnaphthol-(2), $I.C_{10}H_6.OH$.** — ⟨‡⟩ — Ndl. fr. dil. alc. — D.s. h. aq. — Oxidn. by $KMnO_3$ gives phthalic ac.
340	Sbl. in vac. 90–100	**Tetraiodmethane, CI_4.** — ⟨G.O.-A.⟩ — *Dark red* octahedra! — Decd. by heat or sunlight w. sepn. of I. — Boiled w. aq. gives iodoform (No. **5**.420). — Sp. gr. 4.32 (0°).
345	95d.	**1,1,1-Triiodethane, Methyliodoform, $CI_3.Me$.** — ⟨G.O.-A.⟩ — *Yellow* octahedra fr. alc. — D.s. c. alc.; v.s. eth., CS_2, bz.; somewhat less s. lgr.
350	101	**1,4-Diiodbutadiine-(1,3), CI : C.C : CI.** — ⟨*⟩ — Cryst. fr. eth. — Explodes v. violently on heating! — Polym. on keeping.
355	102	**5-Iodsalicylic Ald., $I.C_6H_3.(OH)(CHO)$.**
360	102–3	**4-Iodbenzophenone, $I.C_6H_4CO.Ph$.**
365	104; 106	**α,β-Diiodacrylic Ac., $CHI : CI.CO_2H$.** — ⟨‡⟩ — Cryst. fr. aq. — Vol. w. st. — Mod. s. c. aq.; e.s. alc., eth., chlf.
370	106–7	**$2,2^1$-Diiodbenzophenone, $(C_6H_4I)_2.CO$.** — Lft.

Explanation of typographical signs used in this Division: * = T. 4.7. ‡ = G.O.-D. § = G.O.-E.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — IODINE. — SOLIDS.
375	108	**3-Iod-4-hydroxybenzaldehyde, $I.C_6H_3.(OH)(CHO)$.** — ⟨‡⟩ — **Lft. fr. h. aq.** E.s. alc.
380	108	**$1^1,1,^21^2$-Triiodstyrene, $Ph.CI : CI_2$.** — ⟨*⟩ — Ndl. fr. alc.
385	109–10	**1,2-Diiodxylene, $(CH_2I)_2.C_6H_4$.** — ⟨*⟩ — Yellowish pr. fr. eth.
390	109–10	**1,4-Diiodnaphthalene, $C_{10}H_6.I_2$.** — ⟨*⟩ — Ndl.
395	110	**β-Iodbutyric Ac., $Me.CHI.CH_2.CO_2H$.** — ⟨‡⟩ — Cryst. — Boiled w. x.s. NaOH sol. gives crotonic ac.; or w. dil. Na_2CO_3 sol. gives β-oxybutyric ac.
400	110	**Diiodacetic Ac., $CHI_2.CO_2H$.** — ⟨‡⟩ — Light yel. ndl. — D.s. aq. — $Ba\bar{A}_2$: pale yel. rhombohedra; mod. s. aq.
410	110	**Methyl 3,5-Diiodsalicylate, $I_2(HO).C_6H_3.CO_2Me$.** — Ndl. — V.d.s. aq., e.s. h. alc. — (Pat. Frdl. IV. 1104). — Sapn. gives MeOH.
415	d. abt. 115.	**p-Iodosobenzaldehyde, $OI.C_6H_4.CHO$.**
420	119	**Iodoform, CHI_3.** — ⟨G.O.-A.⟩ — Charac. lemon-yel. hexag. plates, or compound hexag. star shaped forms observed under low magnification; easily obtained by slow cooling or evapn. of warm sol. in dil. alc. — *Odor characteristic*, penetrating, persistent, saffron-like! — Alm. i. aq.; s. 50 pt. c. or 9 pt. h. alc.; more sol. eth., CS_2, chlf. — Volat. at ord. temp.; c. vol. w. st. — Cannot be distd. without decn. — Ⓟ (1) When substituted for chlf. in T. **2**.12 gives carbylamine odor w. aniline & KOH. — (2) 2 or 3 drops of alc. CHI_3 sol. when cautiously heated in t.t. over small flame w. v. little phenol & KOH sol., to drive off alc., gives red deposit, s. in alc. w. carmine red color. (Lustgarten, M. **3**, 717). — (3) Heat dil. sol. in dimethylaniline nearly to boiling, or until sol. begins to grow darker (not too long). Cool and dil. w. alc. Sol. appears red by transmitted or violet by reflected light. (Denigès J. d. Pharm **35** (1900), 207).
425	119–20d.	**Diiodmalonic Ac., $CI_2.(CO_2H)_2$.** — ⟨‡⟩ — Light yel. cryst. fr. anhydrous formic ac. — V.s. aq. — Solutions unstable. — Loses CO_2 in aq. sol.
430	121.5	**Triiod-m-cresol, $I_3Me.C_6H.OH$.** — ⟨‡⟩ — Cryst. fr. alc., bz., lgr. — (Pat. Frdl. III, 873).
435	125	**Tetrolic Ac. Diiodide, $Me.CI : CI.CO_2H$.** — ⟨‡⟩ — Ndl. fr. aq. — E.s. alc., eth., chlf. — $Ag\bar{A}$: lust. lft. which give $Me.C \vdots CI$ on boiling w. aq.
437	127–9	**β-Iodcinnamic Ac., $Ph.CI : CH.CO_2H$.** — ⟨‡⟩ — Lft. — D.s. aq.; s. alc., eth., bz., CS_2.
440	128	**2,4,5,6-Tetraiod-1,3-dimethylbenzene, $I_4.C_6.Me_2$.** — ⟨*⟩ — Silky ndl. fr. gl. ac.ac.
445	129.4	**p-Diiodbenzene, $C_6H_4I_2$.** — ⟨*⟩ — B.p. 285° c. — Lft.
450	133	**β,β-Diiodacrylic Ac., $CI_2 : CH.CO_2H$.** — ⟨‡⟩ — Pr. fr. aq. — Alm. i. c. aq.; e.s. alc., eth.
455	abt. 135d.	**Triphenyliodmethane, $Ph_3.C.I$.** — Colors in light. — Aq. or v. dil. alk. gives triphenylcarbinol. — Boiled w. alc. gives triphenylmethane. (Vol. I.)
460	140; 142	**Iodpropiolic Ac., $IC \vdots C.CO_2H$.** — ⟨‡⟩ — Cryst. fr. bz.; pr. fr. eth. — Gives acetylene, diiodacetylene & CO_2 at m.p., on recrystn., or when aq. sol. of salts are heated at 60–90°. — AgI: white ppt. decg. spontan. to silver acetylide, diiodacetylene & CO_2.
465	140–2d.	**2-Iod-2,3,3-trimethylbutane, $Me_2I.C.CMe_3$.** — ⟨*⟩ — Camphor-like mass. — W. alc-KOH gives heptylene.
470	142 (browning)	**s-Tetraiodacetone, $(CHI_2)_2.CO$.** — ⟨G.O.-A.⟩ — Yel. ndl. — V.s. acetone.
475	145	**(α)-Triiodresorcinol, $C_6H_3O_2I_3$.** — ⟨‡⟩ — Ndl. fr. CS_2. — D.s. h. aq.; e.s. alc., eth., CS_2. — Boiled w. ac. anhydr. gives diacetate: ndl.; e.s. alc., eth.; m.p. 170°.
480	155 r.h.	**6,7-Diiodoctene, $Me.CH : CH.(CH_2)_2.(CHI)_2.Me$.** — ⟨*⟩ — Ndl. — Sbl. when fused.
485	156	**2,4,6-Triiodphenol, $I_3.C_6H_2.OH$.** — ⟨‡⟩ — Odor unpleasant, persistent! — Ndl. fr. dil. alc. — Mod. s. alc. — Boiled w. conc. Na_2CO_3 sol. gives i. red product. — Conc. HNO_3 gives picric ac. (No. **2**.3168).

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — IODINE. — SOLIDS.
490	157d.	**Triiodsalicylic Ac., $I_3(HO).C_6H.CO_2H$.** — ⟨‡⟩ — Yellowish ndl. — I. aq.; s. alc., eth.
495	157–9	**2,5-Diiodbenzoquinone-(1,4), $C_6H_2I_2O_2$.** — ⟨G.O.-A.⟩ — *Yel.* ndl. fr. alc. — W. SO_2 & aq. gives diiodhydroquinone.
500	162	**2-Iodbenzoic Ac., $I.C_6H_4.CO_2H$.** — ⟨‡⟩ — Ndl. — R.d.s. h. aq.; v.d.s. c. aq.; c.s. alc., eth. — $Ba\bar{A}_2.6Aq$: ndl.; v.s. aq. — Chloride: m.p. 35–40°. — Amide: ndl.; m.p. 183.6° c. — Anilide: lft. fr. alc.; m.p. 142°. — $Me\bar{A}$: liq.
505	164	**Pentaiodacetone, $CI_3.CO.CHI_2$.** — ⟨G.O.-A.⟩ — *Yel.* cryst. powd. — V. unstable. — Dil. KOH sol. gives iodoform (No. **5**.420).
510	165–70d.; 175–80	**m-Iodosobenzoic Ac., $IO.C_6H_4.CO_2H$.** — ⟨‡⟩ — Yel., amorph. — Odor strong. — I. chlf., bz.; v.d.s. alc., eth. — Decd. by boiling w. aq. to m-iod- & m-iodobenzoic ac. — Separates I fr. acidified KI sol.! — Bleaches indigo sol.
515	170d.	**$1^1,4^1$-Diiodxylene, $(CH_2I)_2.C_6H_4$.** — ⟨*⟩ — Ndl. — D.s. eth.; s. h. alc., chlf.
517	171	**$1^1,1^2$-Diiodcinnamic Ac., $Ph.CI : CI .CO_2H$.** — ⟨‡⟩ — Tbl. — E.s. alc.
518	173.5–4.5; 192 dried @ (100)	**3-Iod-4-hydroxybenzoic Ac., $I.C_6H_3.(OH)(CO_2H)$.** — ⟨‡⟩ — Ndl. fr. aq. (w. ½ H_2O crystn.). — S. in 576 pt. c. aq.; s.h. aq.; e.s. alc., eth.
520	174	**Iodvanillin, $MeO.C_6H_2.I(OH)(CHO)$.** — ⟨‡⟩ — Ndl. — D.s. c. alc., eth.
525	170–5d.	**o-Iodosotoluene, $IO.C_6H_4.Me$.** — Yellowish mass. — Acetate: m.p. 130–2°.
530	175–8d.	**p-Iodosotoluene, $IO.C_6H_4.Me$.** — V.d.s. alc.; s. gl.ac.ac. — Boiling w. aq. gives p-iodtoluene & p-iodotoluene.
535	177–9	**2,6-Diiodbenzoquinone-(1,4), $C_6H_2I_2O_2$.** — ⟨G.O.-A.⟩ — *Golden* lust. lft. fr. lgr.
537	181–2d	**m-Iodcinnamic Ac., $I.C_6H_4.CH : CH.CO_2H$.** — ⟨‡⟩ — V.d.s. aq.; more s. bz., h. alc.
540	182	**4-Iodphthalic Ac., $I.C_6H_3.(CO_2H)_2$.** — ⟨‡⟩ — Cryst. w. 1½H_2O fr. aq. — In melting gives anhydride: mp. 123°; ndl.; sbl.
545	180–5d.	**m-Iodosotoluene, $IO.C_6H_4.Me$.** — Amorph. yel. mass. — S. c. gl. ac.ac. — Acetate: white ndl.; m.p. 147–9° d.
547	182–4d; 193–4d.	**Iodfumaric Ac., $CO_2H.CH : CI.CO_2H$.** — ⟨‡⟩ — Yel. pr. fr. eth. — V.s. aq., alc., eth., — $KMnO_4 + Na_2CO_3$ sol. oxid. easily. — $Me_2\bar{A}$: yel. pr. fr. pet.-eth.; m.p. 52–2.5°.
550	186–7	**3-Iodbenzoic Ac., $I.C_6H_4.CO_2H$.** — ⟨‡⟩ — Ndl. — D.s. aq. — $Me\bar{A}$: m.p. 54–5°. — Amide: m.p. 186.5° c.
552	186–8	**(Allo-)-β-Iodcinnamic Ac., $Ph.CI : CH.CO_2H$.** — ⟨‡⟩ — D.s. aq., alc., CS_2.
555	abt. 190d.	**m-Iodosobenzaldehyde, $OI.C_6H_4.CHO$.** — Amorph. — I. alc.; e.s. gl. ac.ac. — Separates I. fr. KI sol.
560	192c.; 185; 187; 192	**Tetraiodethene, $CI_2 : CI_2$.** — ⟨G.O.-A.⟩ — Silky *lemon yellow* lft. fr. toluene or gl.ac.ac. — Pr. fr. eth. — Odorless. — Sbl. in tbl. — Warmed w. Br on water bath gives hexabromethane (No. **4**.1760).
565	193.5; 196; 197	**3-Iodsalicylic Ac.-(1), $I(HO).C_6H_3.CO_2H$.** — ⟨‡⟩ — Ndl. on slow cryst. fr. aq. — $FeCl_3$ gives violet color! — $Ba\bar{A}_2 + 3\frac{1}{2}H_2O$: ndl.; s. in 190 pt. aq. @ 8°.
570	198–9	**3,5-Diiod-4-hydroxybenzaldehyde, $I_2.C_6H_2.(OH)(CHO)$.** — ⟨‡⟩ — Cryst. fr. chlf. — D.s. aq.; e.s. dil. alk. — Fusion w. aq.-KOH gives protocatechuic ac.
575	202	**$4,4^1$-Diiodbiphenyl, $I.C_6H_4.C_6H_4.I$.** — ⟨G.O.-A.⟩ — *Yel.* lft. — D.s. c. gl.ac.ac., e.s. h.
580	206	**3-Iodphthalic Ac., $I.C_6H_3.CO_2H$.** — ⟨‡⟩ — Cryst. w. $3H_2O$ fr. aq. — $Ba\bar{A}$: mod. s. aq. — $Et_2\bar{A}$: lft.; m.p. 70°. — Anhydride: m.p. 153°; sbl.
590	208	**2,4,6-Triiod-1,3,5-trimethylbenzene, $I_3.C_6.Me_3$.** — ⟨*⟩ — Pr. fr. bz. — V.d.s. alc., eth.

Explanation of typographical signs used in this Division: * = T. 4.7. ‡ = G.O.-D. § = G.O.-E

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — IODINE. — SOLIDS.
595	Deflag. abt. 210	**p-Iodosobenzoic Ac., $IO.C_6H_4.CO_2H$.** — ⟨‡⟩ — Amorph. — Odor intense. — I. alc., chlf., bz. — Bleaches litmus & indigo cold!
600	Explodes abt. 210	**Iodosobenzene, C_6H_5IO.** — Amorph. — Mod. s. h. aq., alc.; i. eth., lgr., bz. — Separates I fr. acidified KI sol.! — Decd. by boiling w. aq. to iodobenzene, C_6H_5IO, & phenyl iodide. — Acetate: (Ph.I(O.CO.Me)): cryst. fr. sol. of iodosobenzene in gl.ac.ac.; e.s. gl.ac.ac., bz.; d.s, eth.; m.p. 156–7°.
605	d. abt. 210	**o-Iodosobenzaldehyde, $OI.C_6H_4.CHO$.**
610	Expl. 210	**o-Iodotoluene, $IO_2.C_6H_4.Me$.** — Cryst. mass.
615	212–4	**o-Iodcinnamic Ac., $I.C_6H_4.CH : CH .CO_2H$.** — ⟨‡⟩ — Cryst. fr. dil. alc.
620	209–33(?); 244d.; @ 250–2 r.h. explodes.	**o-Iodosobenzoic Ac., $IO.C_6H_4.CO_2H$.** — ⟨‡⟩ — Lust. lft. fr. aq. — V.d. s.c. aq., eth. — (V. weak ac.) — S. in NaOH sol. w. intense yel. color! — Separates I fr. acidified KI sol.! — Pptd. fr. sol. of Ba salt by CO_2. — Short boiling w. ac. anhydr. gives acetyl deriv.: m.p. 166–7°.
623	d. abt. 220	**Tetraiodphenolphthaleine, $C_{20}H_{10}O_4I_4$.** — I. aq.; d.s. alc.; s. chlf., eth. — Hydrated alk. — salts *blue*; e.s.aq.!
625	220–30d.	**3,5-Diiodsalicylic Ac.-(1), $I_2(HO).C_6H_2.CO_2H$.** — ⟨‡⟩ — Ndl. — S. in 1428 pt. aq. @ 15°, or 656 pt. boiling. — E.s. alc., eth. — $FeCl_3$ gives violet color! — $Ba\bar{A}_2.3H_2O$: ndl.; s. in 1350 pt. aq. @ 18°. — MeĀ: ndl.; m.p. 110°.
630	225	**Tetrakis-[iodomethyl]-methane, $C.(CH_2I)_4$.** — ⟨*⟩ — Ndl. fr. toluene. — Alm. i. alc., eth.
635	Expl. 228	**p-Iodtoluene, $IO_2.C_6H_4.Me$.** — Lft. fr. aq. — S. gl.ac.ac.; i. alc., etc.
640	Expl. 227–30; 235	**" Iodobenzene," $C_6H_5IO_2$.** — Long ndl. fr. h. aq. — Alm. i. chlf., acetone, bz. — Evolves Cl fr. dil. HCl. — Ppts. 41 fr. acidified KI sol.!
645	233–4	**$4,4^1$-Diiodbenzophenone, $(C_6H_4I)_2.CO$.** — Lft. fr. toluene. — V.d.s. alc.
650	234.5	**3-Iod-4-methoxybenzoic Ac., $I.C_6H_3.(OMe)(CO_2H)$.** — Ndl. fr. alc. — Alm. i. h. aq.; s. in 165 pt. c. eth. — Sbl. — MeĀ: m.p. 94–5°.
655	d.w.m. abt. 255	**p-Iodcinnamic Ac., $I.C_6H_4.CH : CH.CO_2H$.** — Yellowish indistinctly cryst. — mass.
657	265–6	**4-Iodbenzoic Ac., $I.C_6H_4.CO_2H$.** — ⟨T. **4**.3b.⟩ — Lft. purified by sbl. — MeĀ: long ndl.: m.p. 114°. — Chloride (Ann. **264**, 167): ndl. fr. eth.; m.p. 77–8°. — Amide: m.p. 217.6° c.
660	315–20d.	**2,3,5,6-Tetraiodterephthalic Ac., $I_4.C_6.(CO_2H)_2$.** — Pr. fr. gl. ac. ac. — E.s. alc.; d.s. eth., bz. — $Me_2\bar{A}$: cryst. fr. xylene; v.d.s. eth.; m.p. 310–12°.
665	324–7	**Tetraiodphthalic Ac., $I_4.C_6(CO_2H)_2$.** — Ndl. fr. nitrobenzene. — V.d.s. alc., eth., gl. ac. ac. — MeĀ: s.-yel. scales fr. gl. ac. ac.; m.p. 298° d. — Anhydride: s.-yel. pr.; m.p. 325°, 320–25°; alm. i. alc.; sbl. in yel. ndl.
675	340–50d.	**Hexaiodbenzene, C_6I_6.** — ⟨G.O.-A.⟩ — *Red-Brown* ndl. fr. nitrobenzene. — I. alc., etc.

ANALYTICAL TABLES
OF
ORDER V
COMPOUNDS CONTAINING IODINE AS "ADDITIONAL ELEMENT"

DIVISION B, LIQUID SPECIES.

No.	Boiling-point (C°.)	Specific Gravity	SPECIFIC NAMES. — Tests and Specific Characterizations.
700	29–32		**Iodacetylene, CH : CI.**
705	42.8; 42.3c.	2.2852 (15/15)	**Methyl Iodide, MeI.** — ⟨ ⟩ — Alc. $AgNO_3$ sol. gives ppt. of AgI in the cold. — M.p. – 64°. — Ⓓ T. **4**.7a gives methyl 3,5-dinitrobenzoate: sl. yellowish pearly lft. fr. h. dil. (3:1) alc.; m.p. 107.5° (uncor.)
710	56	2.08 (0)	**Vinyl Iodide, 1-Iodethene, CH_2 : CHI.** — ⟨*⟩ — I. aq.
715	72		**4,6-Diiod-1,3-dimethylbenzene, $I_2.C_6H_2.Me_2$.** — ⟨*⟩ — Ndl. fr. alc. — E.s. eth., chlf., bz., h. alc. — HI + P gives m-xylene @ 140°.
720	72.3	1.943 (15/15)	**Ethyl Iodide, EtI.** — ⟨*⟩ — M.p. = – 118°. — $n_D^{18.5}$ = 1.5133 — Reacts w. c. alc.-$AgNO_3$. — (Alc.-KOH gives ether & ethylene). — Ⓓ T.**4**.7a gives ethyl 3,5-dinitrobenzoate: yellowish ndl. fr. h. dil. (3 : 1) alc.; m.p. 92° (uncor.).
725	82; (93–103)	1.835 (0)	**2-Iodpropylene, Me.CI : CH_2.** — ⟨*⟩.
730	89.5c.	1.7033 (20/4)	**Isopropyl Iodide, Me_2CHI.** — ⟨*⟩ — W. 20 pt. aq. in tube at 100° gives isopropyl alc. easily.
735	98	1.7	**1-Iodpropine-(1), CI : C.Me " (?) ".** — ⟨*⟩ — Odor pungent. — Alm. i. alc. — W. Zn & HCl gives allylene.
740	98–9 sl. d.	1.571 (0)	**2-Iod-2-methylpropane, tert-Butyl Iodide, Me_3CI** — ⟨*⟩ — Heated w. aq. gives HI & trimethylcarbinol easily. — KOH gives isobutylene. — (T. **4**.7a w. Ag dinitrobenzoate gives free dinitrobenzoic ac., but no ester.)
745	102.2c.	1.7427 (20/4)	**Propyl Iodide, Et.CH_2I.** — ⟨*⟩ — M.p. – 98°. — Ⓓ T.**4**.7a gives propyl 3,5-dinitrobenzoate: yellowish scales fr. h. dil. (3 : 1) alc.; m.p. 73.5° (uncor.).
750	102.5c.	1.829 (23)	**Allyl Iodide, 3-Iodpropene-(1), CH_2 : CH.CH_2I.** — ⟨*⟩ — Prolonged heating w. 20 pt. aq. splits to HI & allyl alc.
755	108	1.98 (17)	**Acetyl Iodide, Me.COI.** — ⟨T. **4**.11⟩ — Fumes in air. — Odor choking. — Soon browns w. sepn. of I. — (Sensitive to moisture which gives HI & ac. ac.).
760	109–10c.	2.08 (22)	**Iodallylene, 1-Iodpropine, CI : C.Me.** — ⟨*⟩ — Odor sweet.
765	115	2.018 (0)	**Propargyl Iodide, 3-Iodpropine-(1), CH_2I.C : CH.** — ⟨*⟩ — V.s. alc., eth.; d.s. h. aq. — Combines easily w. I or Hg.
770	117–8; 119–20	1.626 (0)	**sec.-Butyl Iodide, 2-Iodbutane, Me.CHI.Et.** — ⟨*⟩ — Not attacked by aq. in tube at 100° (sep. fr. tert. iodide). — Ⓓ

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No.	Boiling-point (C°.)	Specific Gravity	" ADDITIONAL ELEMENT " — IODINE. — LIQUIDS.
			T. 4.7a gives sec.-butyl 3,5-dinitrobenzoate: nearly colorless pearly scales fr. h. dil. (3 : 1) alc.; m.p. 74° (uncor.).
775	120c.	1.614 (15)	**Isobutyl Iodide, 1-Iod-2-methylpropane, $CH_2I.CHMe_2$.** — ⟨*⟩ — M.p. − 90.7°. — n_D^{20} = 1.49597. — Ⓓ T.4.7a gives isobutyl 3,5-dinitrobenzoate: lust., nearly white scales fr. h. dil. alc. (2 : 1); m.p. 83.5° (uncor.).
780	123–5	2.025 (16)	**Iodmethyl Eth., $ICH_2.O.Me$.** — ⟨§⟩ — Dec. slowly to HI & polyoxymethylene.
785	124–5 (th.i.); 128–9c.	1.524 (0)	**2-Iod-2-methylbutane, $Me_2CI.Et$.** — ⟨*⟩ — Completely changed to dimethylethylcarbinol & HI by shaking 1½ hr. w. 1½ pt. c. aq. — Alc.-KOH gives mixt. of amylenes.
790	127–9d.	1.050 (0)	**1-Iod-2,2-dimethylpropane, $CH_2I.CMe_3$.** — ⟨*⟩.
795	127–8		**Propionyl Iodide, Et.COI.** — ⟨T. 4.11⟩.
800	130	1.617 (20/4)	**Butyl Iodide, $Et.CH_2.CH_2I$.** — ⟨*⟩ — Ⓓ T. 4.7a. gives butyl 3,5-dinitrobenzoate: nearly colorless pearly scales fr. h. dil. (2 : 1) alc.; m.p. 64° (uncor.).
805	132–3; 131–3	1.682 (0)	**Crotyl Iodide, 1-Iodbutene-(2), $CH_2I.CH : CH.Me$.** — ⟨*⟩ — Odor sharp. — Changes to 6,7-diiodoctene-(2) on keeping.
810	137–9		**2-Methyl-3-iodbutane, $Me_2CH.CHI.Me$.** — ⟨*⟩.
815	138		**Iodcyclobutane, ⌜$CHI.(CH_2)_2.CH_2$⌝.** — ⟨*⟩.
820	140–4d.		**3-Iod-3-methylpentane, Et.CMeI.Et.** — ⟨*⟩.
825	142		**2-Iod-2-methylpentane, $Me_2CI.(CH_2)_2.Me$.** — ⟨*⟩.
830	141–3d. (760)		**3-Iod-2,2-dimethylbutane, $Me_3C.CHI.Me$.** — ⟨*⟩ — Sp. gr. 1.394 (0°).
835	140 (749)	1.394 (0)	**2-Iod-2,3-dimethylbutane, Pinacolinalcohol Iodide, Me.CIMe.-$CHMe_2$.** — ⟨*⟩ — W. AgĀ & eth. gives tetramethylethylene.
840	140		**4-Iod-2-methylbutine-(4), $Me_2.CH.C : CI$.** — ⟨*⟩ — Heated w. NaOEt gives isopropylacetylene.
842	140–2		**2-Iod-2,4-dimethylpentane, $ICMe_2.CH_2.CHMe_2$.** —
845	144–5	1.539 (0)	**2-Iodpentane, $Me.CHI.(CH_2)_2.Me$.** — ⟨*⟩.
850	142–7d.		**3-Iod-2-methylpentane, $Me_2CH.CHI.Et$.** — ⟨*⟩.
855	145–6	1.528 (0)	**3-Iodpentane, Et.CHI.Et.** — ⟨*⟩.
860	144–5; 146–7; 148c.	1.5232 (15/4) 1.543 (16) 1.507 (21)	**1-Iod-3-methylbutane, act. Amyl Iodide, $CH_2I.CHMe.C_2H_5$.** — ⟨*⟩ — $[\alpha]_D$ = 4.28°.
865	145–7	1.391 (0)	**3-Iod-3-methylhexane, $Et.CMeI.C_3H_7$.** — ⟨*⟩.
870	146–8		**Butyryl, Iodide, $Et.CH_2.COI$.** — ⟨T. 4.11⟩.
875	147–8d.	2.15, 2.45 (0)	**2,2-Diiodpropane, Iodacetole, $Me,CI_2.Me$.** — ⟨§⟩ — Alc.-KOH gives Me.CI : CH_2. — Ag_2O gives acetone.
880	148.2c.; 147c.	1.468 (0)	**Isoamyl Iodide, 4-Iod-2-methylbutane, $Me_2CH.CH_2.CH_2I$.** — ⟨*⟩.
885	156c.; 152	1.543 (0)	**n-Amyl Iodide, $C_4H_9.CH_2I$.** — ⟨*⟩.
890	158–60 sl.d.		**4-Iod-2-methylpentane, $Me_2CH.CH_2.CHI.Et$.** — ⟨*⟩ — S. org. solv.; i. aq.
895	164–6		**3-Iodhexane, $Et.CHI.C_3H_7$.** — ⟨*⟩.
900	164.6d.	1.497 (0)	**5-Iodhexene-(1), $Me.CHI.(CH_2)_2.CH : CH_2$.** — ⟨*⟩.
905	166–7c.	1.6945 (22/4)	**Iodcyclopentane, ⌜$CHI.(CH_2)_3.CH_2$⌝.** — ⟨*⟩.
910	168.5c.	1.453 (0)	**2-Iodhexane, $Me.CHI.(CH_2)_3.Me$.** — ⟨*⟩ — Long boiling w. 45 pt. aq. gives sec. hexyl alc. & hexylene.
915	165–75d		**5-Iod-2-methylhexane, $Me_2CH.(CH_2)_2.CHI.Me$.** — ⟨*⟩.
917	169–71c.	1.841 (7)	**Methyl β-Iodacetate, $CH_2I.CH_2.CO_2Me$.** — ⟨§⟩ — Sapon. gives MeOH.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENTS " — IODINE. — LIQUIDS.
920	176-7 sl.d.	2.905 (20)	**Glycoliodhydrine, 2,2-Iodethanol-(1), $CHI_2.CH_2OH$.** — ⟨§⟩ — Mod. s. aq. — Cautiously heated w. $Pb(OH)_2$ gives alm. quantitative yield acetaldehyde.
925	177-9	2.84 (0)	**1,1-Diiodethane, Ethylidene Iodide, $CHI_2.Me$.** — ⟨*⟩ — Alc.-KOH gives C_2H_3I.
930	178-80	1.808 (20/20)	**Ethyl Iodacetate, $CH_2I.CO_2Et$.** — ⟨*⟩ — B.p. 73° (16 mm.). — Colorless oil decg. w. sepn. of I in light. — $n_D^{12.7}$ = 1.50789. — Sapon. gives EtOH.
935	180 sl. d.	3.333 (15/15) 3.3254 (20/4)	**Methylene Iodide, CH_2I_2.** — ⟨*⟩ — M.p. + 4°. — 10 g. aq. @ 20° dis. 1.419 g — n_D^{15} = 1.7425.
940	180-5d.		**2,4-Diiodpentane, $Me.CHI.CH_2.CHI.Me$.** — ⟨*⟩.
945	182c.	1.461 (0)	**n-Hexyl Iodide, $Me.(CH_2)_4.CH_2I$.** — ⟨*⟩ — n_D^{20} = 1.4414.
950	185		**4-Iodheptane, $(Me.CH_2.CH_2)_2.CHI$.** — ⟨*⟩.
955	185	3.062 (0)	(Liq.modif.) **1,2-Diiodethylene, CHI : CHI** (?). — ⟨*⟩ — Colorless liq. — Solid at − 21°. — Contact w. HI gives ordinary solid modif., m.p. 73°.
960	187; 192c.; 185		**Tetraiodethene, $CI_2 : CI_2$.** — ⟨G.O.-A.⟩ — Silky *lemon yel.* lft. fr. gl.ac.ac. — Pr. fr. bz. + little alc. — Odorless. — V.s. CS_2; d.s. c. abs. alc. — In light dec. to I_2 & C_2I_2. — W. S in CS_2 gives $C_2I_4 + 4S_8$: yel. tbl.; m.p. 97-103°.
965	188.4 (756)	1.8401 (15/15) 1.8321 (20/4)	**Iodbenzene, Phenyl Iodide, C_6H_5I.** — ⟨*⟩ — M.p. = − 28.5°c. — Ice cooled sol. in 3 pt. chlf. on saturation w. Cl gas gives long yel. ndl. of $C_6H_5ICl_2$ wh. begin to lose Cl from 80°.
970	198	2.62 (0)	**1,2-Diiodpropene, Allylene Iodide, CHI : CI.Me.** — ⟨*⟩.
975	200; 202	1.679 (15)	**Ethyl β-Iodpropionate, $CH_2I.CH_2.CO_2Et$.** — ⟨§⟩ — Sapon. gives gives EtOH.
980	201	1.386 (16)	**1-Iodheptane, $CH_2I.(CH_2)_5.Me$.** — ⟨*⟩.
985	204; 211 (th.i.)	1.697 (20)	**o-Iodtoluene, $I.C_6H_4.Me$.** — ⟨*⟩ — Oxid. by dil. HNO_3 to o-iodbenzoic ac. — Cl gives dichloride, when passed into c. conc. sol. in chlf., which dec. @ 91°.
990	204	1.698 (20)	**m-Iodtoluene, $I.C_6H_4.Me$.** — ⟨*⟩.
995	210; 206-7	1.310 (16)	**2-Iodoctane, $Me.CHI.(CH_2)_5.Me$.** — ⟨*⟩.
1000	217; 229		**2-Iod-1,4-dimethylbenzene, $I.C_6H_3.Me_2$.** — ⟨*⟩ — Vol. w. st. — Gives p-xylene first w. HI + P @ 140°.
1005	218-9		**s-Diiodmethyl Eth., $(I_2CH)_2O$.** — ⟨§⟩ — (Fr. HI & crude formic ald.). — E.s. alc., eth.
1010	225		**4-Iod-1,2-dimethylbenzene, $I.C_6H_3.Me_2$.** — ⟨*⟩.
1015	225.5	1.337 (16/4)	**1-Iodoctane, $CH_2I.(CH_2)_6.Me$.** — ⟨*⟩.
1020	225 (748)	2.349 (13)	**3-Iodpropanol-(1), $CH_2I.CH_2.CH_2.OH$.** — ⟨§⟩ — Thick liq. — Odor faint, radish-like. Colors in air. — D.s. aq.; e.s. alc., eth.
1025	227d.	2.5631 (19/4)	**1,3-Diiodpropane, Propylene Iodide, $CH_2I.CH_2.CH_2I$.** — ⟨*⟩.
1030	228-30		**2-Iod-1,3-dimethylbenzene, $I.C_6H_3Me_2$.** — ⟨*⟩ — Oil. — E. vol. w. st. — Boiled w. HI + P easily yields m-xylene.
1035	232	1.661 (13)	**4-Iod-1,3-dimethylbenzene, $I.C_6H_3.Me_2$.** — ⟨*⟩.
1040	234		**4-Iodisopropylbenzene, $I.C_6H_4.C_3H_7$.** — ⟨*⟩ — Liq.
1045	234-5 (760)		**5-Iod-1,3-dimethylbenzene, $I.C_6H_3.Me_2$.** — ⟨*⟩ — E. vol. w. st. — (HI + P gives m-xylene only when heated to 182°.).
1050	250		**4-Iodpropylbenzene, $I.C_6H_4.C_3H_7$.** — ⟨*⟩ — S. alc.; e.s. eth.
1055	295-6		**2,4-Diiodtoluene, $I_2.C_6H_3.Me$.** — ⟨*⟩ — Still liq. @ − 13°.
1060	305 undecd.		**1-(α)-Iodnaphthalene, $C_{10}H_7I$.** — ⟨*⟩ — Thick oil not solidified by cold. — Misc. alc., eth., bz., CS_2. — (W. alc.-KOH @ 160° gives some naphthalene). — Picrate: gold-yel. ndl. m.p. 127°.

Explanation of typographical signs used in this Division: * = 4.7. § = G.O.-E.

CHAPTER VI

ORDER VII

COMPOUNDS CONTAINING SULPHUR AS "ADDITIONAL ELEMENT"

GENERAL OBSERVATIONS

(A) Color (T. **4**.1). — The tabulated species of Order VII, with the unimportant exception of the red-brown No. **7**.910, are colorless or at the most yellowish. The presence of quinonic groups develops color as illustrated by No. **3**.765 which is " intensely yellow." The existence of thiobenzophenone as a blue oil, and of vat dyestuffs like " Thioindigo Red ", shows that other colors than yellow sometimes occur among the untabulated species.

(B) Divisions. — Order VII contains a Division A for solids and a Division B for liquids. Neither division is subdivided into sections.

(C) Odor. — Odor in this order is an important diagnostic characteristic. Many species are absolutely odorless, but many others like the volatile mercaptans (T. **4**.13) and alkyl sulphides have such overpowering and pervasive odors of the garlic or mustard type that their presence, even in minute quantities as impurities in other substances, attracts instant attention. (It would be unsafe to infer that the omission of any statement regarding odor in a specific characterization is equivalent to a statement that the compound in question is odorless.)

(D) Acidity. — Always apply Test **4**.3. Neutral and acidic species are numerous. No tabulated species react alkaline to litmus. The strong acids capable of giving satisfactory " neutralization equivalents " are either sulphonic acids or carboxylic acids. The mercaptans (which are nearly insoluble in water, but dissolve readily in caustic alkali) are very feebly acidic, being often expelled from their alkaline solutions by boiling when they are volatile.

(E) Species Showing Characteristic Behavior in the Alkali-Fusion. — The fusion with alkali (T. **4**.8) should be applied to all acids, and in nearly all other cases when the substance is a solid and not too volatile. If this test gives no sulphurous acid, the compound cannot be a sulphonic acid, a sulphinic acid, or a sulphone; while if hydrogen sulphide is formed, there is a probability that the compound yielding it contains bivalent sulphur.

(F) Derivatives for Sulphonic and Carboxylic Acids and their Metallic Salts. — Compounds which have been found to be sulphonic or carboxylic acids, and their metallic salts, should be converted into suitable derivatives (acid chlorides, amides, methyl esters, etc.) by the methods described in T. **4**.10.

The metallic salts of the sulphonic acids of this order require identification much more frequently than the free acids, since the latter are usually so soluble and hygroscopic that they are difficult to isolate and purify. The acids have, therefore, seldom been fully described in the literature even when the salts find technical application.

(G) **Sulphur Content.**** — Determination of the percentage of sulphur in a compound by the method of Carius is usually advisable when other tests suggested in the procedure fail to give a conclusive identification.

(H) **Miscellaneous Types.** — [*The sign* (*) *in the Analytical Tables of Order* 7 *is always a reference to G.O.-H.*

Esters of Sulphonic, Carboxylic, Sulphuric, Sulphurous, and Thiocarbonic Acids. — Saponify by Procedure 2 of Generic Test VII (Vol. I) and identify such alkali-stable products as can be isolated. (Alkyl thiocarbonates yield mercaptans as saponification products.)

Mercaptans and Thiophenols, RSH. — Read T. **4**.13.†

Sulphones, $R.SO_2.R$. — Very stable, odorless, colorless, neutral. Not readily oxidized or reduced, or attacked in the cold by phosphorus pentachloride.

Sulphoxides, R.SO.R. — Odorless, colorless, neutral. Readily oxidized by HNO_3 or $KMnO_4$ to sulphones. Reduced to sulphides by nascent hydrogen or phosphorus pentachloride. Distinguished from sulphones, according to Fries and Vogt (Ann. **381**, 313–1911), by giving a red bromine coloration when treated with a solution of HBr in glacial acetic acid.

Thioethers, Sulphides, R.S.R. — Odor of preparations, as commonly obtained, unpleasant and alliaceous. Unlike mercaptans, insoluble in aqueous sodium hydroxide solution, and oxidized by HNO_3 or $KMnO_4$ to sulphoxides and sulphones, instead of to sulphonic acids. Often give crystalline addition products with Br_2, I_2, or CH_3I.

Thiophene Derivatives. — Thiophene and many of its homologues and derivatives containing the thienyl, C_4H_3S–, radical give intense bluish colorations on treatment with isatine and sulphuric acid. Success in this much used " indophenine reaction " is dependent on careful observance of certain conditions. See No. **2**.135 and Ber. **37**, 3128.

** The sulphones, and compounds like sulphoxides and sulphides that oxidize to sulphones often require heating for long periods at inconveniently high temperatures in the Carius tube to ensure a complete conversion of their sulphur to sulphuric acid. According to an unpublished investigation by O. L. Leonard these refractory substances are readily oxidized if the usual procedure is slightly modified. The modification consists in adding 0.5 gram of potassium chlorate to the 2 c.c. of fuming nitric acid in the outer tube. Six hours heating at 200° in the bomb oven is then sufficient. Great care should naturally be taken to prevent direct contact between the materials in the inner and outer tubes during the manipulations preliminary to heating, since it is conceivable that explosions might otherwise result in some cases. (For details of the usual Carius procedure, read Gattermann's Practical Methods of Organic Chemistry, third Edition, p. 86.)

† The color reactions included under T. **4**.13 have been copied from sources mentioned in the text without experimental verification by the author.

ANALYTICAL TABLES

OF

ORDER VII

COMPOUNDS CONTAINING SULPHUR AS "ADDITIONAL ELEMENT"

DIVISION A, SOLID SPECIES

No.	Melting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	14.5--5	**Propylsulphoxide, Pr_2SO.** — ⟨*⟩ — Ndl. — Does not dist.
55	17	**Diisobutylsulphone, $(C_4H_9)_2.SO_2$.** —⟨*⟩ — B.p. 265°. — Sp. gr. = 1.0056. — V. stable.
60	20	**Diacetyl Disulphide, Me.CO.S.S.CO.Me.** — Odor faint. — Colorless cryst. — I. aq.; e.s. alc., eth., CS_2. — Rapidly decd. by boiling w. aq. or alk. to thioacetic ac. (No. **7.** 1420) & S.
65	24	**Trithioacetone, $(C_3H_6S)_3$.** — B.p. 225–30d. — Long ndl. fr. alc. — I. aq.; e.s. alc., eth., chlf., bz. — Oxidn. by $KMnO_4$ in acid sol. gives the sulphone: ndl. fr. gl. ac. ac.; m.p. 302°. (Ber. **22,** 2597.)
70	24	**Thiolbenzoic Ac., Ph.CO.SH.** — ⟨G.O.-D.⟩ — Strong smelling oil solidified by snow. — Vol. w. st. — I. aq.; misc. alc., eth., CS_2. — KĀ: yellowish cryst.; e.s. aq.; sol. giving greenish-yel. ppt. w. $CuSO_4$ sol. — AgĀ: yel.-white ppt.
75	25	**2,5-α-Acetomethylthienone, $Me.C_4H_2S.CO.Me$.** — M.p. 232–3°: Vol. w. st. — Tbl. — Oxidn. w. $KMnO_4$ gives thiophenedicarbonic ac. (No. **7.**1285) — Oxime: ndl. fr. dil. alc.; m.p. 125°.
85	27	**Thioresorcinol, $m\text{-}C_6H_4(SH)_2$.** — ⟨T. **4.**13⟩ — B.p. 243°. — Odor penetrating! — PbĀ: or. ppt.
90	28	**Ethylxanthyl Disulphide, $[EtO.CS]_2S_2$.** — Tabular pr. — I. aq.; v.s. abs. alc., eth. — Alc.-KOH gives xanthate, CO_2, S & aq. — (Fr. potass. xanthate & I).
95	29–30	**Monothiohydroquinone, $p\text{-}HO.C_6H_4.SH$.** — B.p. 166–8° (45 mm.). — Cryst. mass. — Odor intense! — S. aq. — Sol. in conc. H_2SO_4, blue-green! — $Pb\bar{A}_2$: yel. ppt.
100	29–30	**Dipropylsulphone, $(n\text{-}C_3H_7)_2.SO_2$.** — ⟨*⟩ — Scales.
105	29–30	**Di-act.-amylsulphone, $(Me,Et.CH.CH_2)_2SO_2$.** — ⟨*⟩ — Ndl. fr. pet.-eth.
110	30–1; 32	**Thionaphthene, ⌜$C_6H_4.CH : CH.S$⌝.** — B.p. 221–2°. — Colorless. — Odor like naphthalene. — Lft. — Vol. w. st.— S. in conc. H_2SO_4 w. cherry red color. — $\bar{B}$.Pk: golden ndl. fr. alc.; m.p. 149°.
115	31	**Isoamylsulphone, $(C_5H_{11})_2.SO_2$.** — ⟨*⟩ — B.p. 295° (undecd.) — Long ndl. — D s. aq., alk.; v.s. alc., etc. — V. stable. — No reaction w. PCl_5.
120	32	**Di-n-butylsulphoxide, Bu_2SO.** — ⟨*⟩ — Ndl. — I. aq. — Dec. on distn.
125	33	**$2,2^1$-Dithienyl, $C_4H_3S.C_4H_3S$.** — B.p. 260°. — Lft. fr. dil. alc. — E.s. alc., eth., gl. ac. ac. — Boiled w. $KMnO_4$ sol. gives α-thiophenecarbonic ac. (No.

No.	Melting-point (C°.)	" ADDITIONAL ELEMENT " — SULPHUR. — SOLIDS.
		7.835): m.p. 126.5°. — Sol. in gl. ac. ac. warmed w. x.s. Br gives perbrom deriv., $C_8Br_6S_2$: ndl. fr. alc.; m.p. 257°.
130	34–5	**Phenyl Ethanesulphonate, $EtSO_2.OPh$.** — ⟨*⟩ — B.p. 287–8°. — **Lft. fr. eth.** + lgr. — E.s. c. alc., bz.
135	35	**Phenyl Benzenesulphonate, $PhSO_3.Ph$.** — ⟨*⟩ — Silky tbl. — Mod. s. alc., eth. — Sapd. by alk.
140	36	**Isopropylsulphone, $(Me_2CH)_2SO_2$.** — ⟨*⟩ — Cryst. — V.s. aq.
145	36	**Methylethylsulphone, $MeSO_2Et$.** — ⟨*⟩ — Boils undecd. — Ndl. — E.s. aq., alc.; d.s. c. eth.; v.s. bz., chlf. — Odorless.
150	37–8; 35	**Diisoamylsulphoxide, $(C_5H_{11})_2SO$.** — ⟨*⟩ — Ndl. — I. aq.
155	37–8	**Isoamylsulphoxide, $(C_5H_{11})_2SO$.** — ⟨*⟩ — Ndl. — I. aq.
160	38	**o-Tolyl Disulphide, $(Me.C_6H_4)_2S_2$.** — ⟨*⟩ — Lft. fr. alc.
165	40	**Methylenediphenyl Disulphide, $CH_2(SC_6H_5)_2$.** — ⟨*⟩ — Ndl. — D. vol. w. st.
170	40–1	**2-Phenylthiophene, $Ph.C_4H_3S$.** — ⟨*⟩ — Tbl. fr. dil. alc. (Often sep. oily fr. other solvents). — Odor aromatic like diphenyl. — E.s. alc.; deliq. in eth., CO_2, lgr., bz. — Gives " indophenine react." even in cold (blue-violet & then dark blue).
172	41.5	**Phenyl α-Naphthyl Sulphide, $Ph.S.C_{10}H_7$.** — ⟨*⟩ — B.p. 218° (14 mm.) — Lust. pr. fr. dil. alc. — R.d.s. c. alc., eth.
175	42	**Ethylphenylsulphone, $Et.SO_2.C_6H_5$.** — ⟨*⟩ — B.p. a. 300° undecd. — Thick tbl. fr. eth. — D.s. c. aq.; more s. h.; e.s. alc., eth.
180	43	**Thio-4-cresol, $Me.C_6H_4.SH$.** — ⟨T. **4**.13⟩ — B.p. 195° (760); 194°; 191°. — Lft. fr. eth. — E.s. eth.; less s. alc. — S. warm conc. H_2SO_4 w. blue color! — $Ag\bar{A}_2$: lft.
185	43.5	**n-Butylsulphone, $(C_4H_9)_2SO_2$.** — ⟨*⟩ — Cryst. plates.
190	45	**Phenyl Benzenethiolsulphonate, Phenyldisulphoxide, Oxyphenyl Disulphide, $C_6H_5.SO_2.SC_6H_5$.** — ⟨*⟩ — Ndl. fr. alc. — I. aq., alk.; e.s. eth., alc., h. bz. — Boiled w. KOH sol. gives phenyldisulphide & benzenesulphinic ac.
195	46	**p-Tolyl Disulphide, $(Me.C_6H_4)_2S_2$.** — ⟨*⟩ — Ndl. or lft. — S. alc.; v.s. eth.
200	47	**Dimethyl Methionate, $CH_2.(SO_3Me)_2$.** — ⟨*⟩ — Ndl. — Dist. w. sl. dec. — Saponified by h. aq. ! — (Corresp. ac. deliq.).
205	abt. 48	**1,4-Dimethylbenzene-2-sulphonic Ac., $Me_2.C_6H_3.SO_3H$.** — ⟨G.O.-D,E,F.⟩ — $Ba\bar{A}_2$: crusts.; 100 pt. aq. dis. 2.27 pt. @ 0°, or 5.53 pt. @ 100°. — Chloride: m.p. 24–6°. — Amide: ndl.; d.s. h. aq.; m.p. 147–8°.
210	48	**Benzoyl Sulphide, $(Ph.CO)_2S$.** — ⟨*⟩ — Pr. fr. eth. — I. aq., c. alk.; e.s. ammon. on warming, giving benzamide (No. **2**.2051) & thiolbenzoic ac.
215	49	**Benzyl Sulphide, $(PhCH_2)_2S$.** — ⟨*⟩ — Rhomb. tbl. fr. eth. — S. alc., eth.; i. aq. — C. HNO_3 (sp. gr. 1.3) gives benzyl sulphoxide: lft.; s. h. aq.; m.p. 130°, 133°.
220	49–51	**2,5-Methylphenylthiophene, $Me.C_4H_2S.Ph$.** — ⟨*⟩ — Lust. ndl. fr. alc. — E. vol. w. st. — E.s. alc., eth., chlf., bz. — Warmed w. isatine & conc. H_2SO_4 gives blue sol.!
225	50.5	**Cetylmercaptan, $C_{16}H_{33}SH$.** — ⟨*⟩ — Cryst. — (Ann. **83**,18.)
230	51	**Tetrahydro-α-thiophenecarbonic Ac., $C_4H_7S.CO_2H$.** — ⟨G.O.-D.⟩ — **Lft. fr.** c. aq. — Dist. (sl. d.). — Vol. w. st. — E.s. aq., alc.; less s. eth. — Odor unpleasant. — Gives " indophenine react." (No. **7**.1395) w. isatine & conc. H_2SO_4! — Red. ammon. $AgNO_3$ sol. on boiling!
235	53–4	**Pyrocatechol-3-sulphonic Ac., $(HO)_2.C_6H_3.SO_3H$.** — ⟨G.O.-D & E.⟩ — V. deliq. ndl. — $Ba\bar{A}_2.2H_2O$: sm. pr.; d.s. c. aq.
240	54	**Benzenesulphonic Anhydride, $(PhSO_2)_2O$.** — V. deliq. pr. fr. chlf. — Dec. before distn. — Combines quickly w. aq. to benzenesulphonic ac.
245	55	**Phenylthienylketone, $Ph.CO.C_4H_3S$.** — ⟨*⟩ — B.p. 300°. — Long ndl. fr. dil. alc. — I. aq.; e.s. h. alc., eth. — Warmed w. isatine & conc. H_2SO_4 gives blue color! — Ignition w. CaO gives thiophene (No. **7**.1395) & benzene.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — SULPHUR. — SOLIDS.
250	55–6	**Thienyl Disulphide, $(C_4H_3S)S_2$.** — ⟨*⟩ — Lust. yel. ndl. — (Ber. **20**, 1757).
255	55–6	**Ethyl-p-tolylsulphone, $Et.SO_2.C_6H_4Me$.** — ⟨*⟩ — Tbl. fr. alc. — E.s. eth., chlf., bz., h. alc.
260	56; 53-	**Methyl β-Naphthalenesulphonate, $C_{10}H_7.SO_3.Me$.** — ⟨*⟩ — Tbl. fr. alc. + ac.-eth. — (B.p. 224–5° @ 15 mm.).
265	56–7	**p-Tolyl Sulphide, $(Me.C_6H_4)_2.S$.** — ⟨*⟩ — Dist. a. 300°. — Sm. ndl. — **I. aq.** e.s. h. alc., bz., eth.
270	57.5	**Cetyl Sulphide, $(C_{16}H_{32})_2S$.** — ⟨*⟩ — Lft. — (Ann. **83**, 16).
280	59	**Diphenylmethanedisulphonic Ac., $C_{13}H_{10}(SO_3H)_2$.** — ⟨G.O.-D,E,F.⟩ — Deliq. lft. — S. alc. — BaĀ: scales; e.s. aq.; i. alc. — Anilide: m.p. 178°. — Acid chloride: pr. fr. chlf.; m.p. 124°.
285	60–61	**Phenyl Disulphide, $C_6H_5.S.S.C_6H_5$.** — B.p. 310°, decg. to S & phenyl sulphide; 190–2° (15 mm.). — Ndl. — I. aq.; s. alc.; v.s. eth., CS_2 bz. — Conc. HNO_3 oxid. to benzenesulphonic ac. — W. Zn + sulphuric ac. gives disagreeable odor of the mercaptan at once.
295	61–2; 43.5	**Phenylthiolglycolic Ac., $PhS.CH_2.CO_2H$.** — ⟨G.O.-D.⟩ — Tbl. — D.s. c. aq.; more s. h.; misc. alc., eth. — V. stable. — KĀ: ndl.; d.s. c. aq.; may be fused without decn. w. KOH. — Oxidn. w. $KMnO_4$ gives phenylsulphonacetic ac. (No. **7**.710), m.p. 112°.
300	61–2	**Phenyl Methanesulphonate, $Me.SO_2.OPh$.** — ⟨*⟩ — Lft. fr. alc.* — Sbl. undecd. — E.s. abs. alc., eth., chlf., bz.; v.d.s. c. lgr. — Sapn. w. NaOH sol. gives phenol & methanesulphonic ac.
305	65–6; 50–1	**Benzene Sulphonic Ac., $C_6H_5SO_3H$.** — ⟨G.O.-D, E,F.⟩ — Cryst. mass. — Deliq. — (Cryst. w. 1 or $1\frac{1}{2}$ H_2O in tbl., m.p. 43–4°; aq. not removed in H_2SO_4 dessicator. M.p. 65–6° for product distd. in cathode-light vacuum). — V.s. aq., alc.; v.d.s. bz.; i. eth., CS_2. — $Ba\bar{A}_2.H_2O$: lft. or tbl.; d.s. alc. — RĀ: liq. — Chloride: m.p. + 14.5°. — Amide: lft. fr. h. aq.; 0.43 pt. dis. in 100 pt. aq. @ 16°; m.p. 150°; 147–8°; 149°; 156°. — p-Toluide: m.p. 120°; 122°.
310	67.5	**Phenyl-o-tolylsulphone, $C_6H_5.SO_2.C_7H_7$.** — ⟨*⟩ — Lft.
315	68.5	**Diisobutylsulphoxide, $(C_4H_9)_2SO$.** — ⟨*⟩ — Cryst. — Less s. in warm than in cold aq.
320	69	(Solid) **Thioisovalerianic Ald., $C_5H_{10}S$.** — Asbestos-like cryst. fr. eth. — Unpleasant odor. — I. aq.
325	69–70	**Resorcinyl Benzenesulphonate, $C_6H_4.(SO_3Ph)_2$.** — ⟨*⟩ — Ndl. fr. alc.
330	70	**Diethylsulphone, Et_2SO_2.** — ⟨*⟩ — B.p. 248° undecd. — Rhomb. tbl. — S. in 6.4 pt. aq. (16°). — (*Not* at. by PCl_5.)
332	71	**Thiopalmitic Ac., $Me.(CH_2)_{14}.COSH$.** — Ndl. fr. bz.
335	70.5	**Diphenylsulphoxide, Thionylbenzene, $(C_6H_5)_2SO$.** — ⟨*⟩ — B.p. 340° d. — Cryst. fr. lgr. — E.s. alc., eth., bz., gl. ac. ac.; d.s. lgr. — Oxid. by $KMnO_4$ in gl. ac. ac. sol. to diphenylsulphone., m.p. 128–9° (No. **7**.850).
340	71	**2-Ethylthiophenecarbonic Ac., $Et.C_4H_2S.CO_2H$.** — ⟨G.O.-D.⟩ — Lust. cryst. — D.s. c. aq.; e.s. alc., eth. — AgĀ: curdy ppt. — Oxidn. by $KMnO_4$ gives thiophenedicarbonic ac.
345	71	**3-Oxythionaphthene, $\ulcorner C_6H_4.CO.CH_2.S \urcorner$.** — Long colorless ndl. — Not dist. — D.s. c. aq.; e.s. NaOH sol. — Vol. w. st. — Odor like α-naphthol. — In alk. sol. is rapidly oxid. to i. Thioindigo Red B.
350	72	**Trimethylene Disulphide, $C_3H_6S_2$.** — Cryst. powd. — I. alc., eth.; s. bz.
355	71–2	**Benzyl Disulphide, $(PhCH_2)_2S_2$.** — Lft. fr. alc. — D.s. c. alc.; e.s. eth., bz., h. alc.
360	72.5	**Diphenyl-$4,4^1$-disulphonic Ac., $[HSO_3.C_6H_4-]_2$.** — ⟨G.O.-D,E,F.⟩ — Deliq. cryst. — KOH fusion gives γ-biphenol. — BaĀ: (by. pptn. of h. aq. KĀ sol. by $BaCl_2$). — i. aq., or min. acid. Chloride: s. alc., eth., bz.; m.p. 203° d. — Amide: m.p. a. 300°; d.s. alc., bz.
365	72–3	**2,4-Methylphenylthiophene, $Me.C_6H_2S.Ph$.** — ⟨*⟩ — Pearly lft. fr. dil. alc. —

No.	Melting-point (C.°)	"ADDITIONAL ELEMENT" — SULPHUR. — SOLIDS.
		Dist. undecd. — E.s. h. alc., eth., chlf., bz. — W. x.s. Br gives tetrabrom deriv: lft. fr. alc.; m.p. 136–7°.
370	74–5	**α-Naphthyl Trisulphide, $(C_{10}H_7)_2S_3$.** — Mic. pale yel. cryst. fr. much gl. ac. ac.
375	74–5	**Benzylhyposulphurous Ac., $Ph.CH_2.S.SO_3H$.** — ⟨G.O.-D.⟩ — (Benzyl chloride & sod. thiosulphate.) — Cryst. decd. by boiling w. aq. to benzylmercaptan & H_2SO_4.
380	74–5	**Dithienylphenylmethane, $Ph.CH(C_4H_3S)_2$.** — ⟨*⟩ — Ndl. fr. alc.
385	75	**p-Tolyl Tetrasulphide, $(Me.C_6H_4)_2.S_4$.** — Lft. fr. alc. — E.s. eth., h. alc. — Slowly decd. by KOH sol. to S & p-tolyl disulphide.
390	75.5	**Diallylhexasulphide, $(C_3H_5)_2S_6$.** — D.s. alc.; e.s. eth. — (Fr. glycerine & S @ 300°).
395	75–8	**Thioacetacetic-ester, $[Me.CO.CH(CO_2Et)\text{-}]_2S$.** — Ndl. fr. alc. — E.s. chlf., bz.; less s. alc., eth.
400	76	**Thienylacetic Ac., $C_4H_3S.CH_2.CO_2H$.** — ⟨G.O.-D.⟩ — Cryst. — S. h. aq., alc., eth. — $Ba\bar{A}_2$ (@ 130°): cryst. — $Ag\bar{A}$: ppt.
405	76; 78	**p-Tolyl p-Toluenethiosulphonate, $Me.C_6H_4.SO_2.SC_6H_4Me$.** — ⟨G.O.-E.⟩ — Monoclin. pr. fr. abs. alc. — E.s. h. alc., bz., eth. — Boiled w. KOH sol. gives toluenesulphuric ac. & tolyl disulphide. — (Fr. oxidn. of p-thiocresol by HNO_3.)
410	76	**Trional, 2,2-Bisethylsulphonebutane, $Me.C(EtSO_2)_2.Et$.**— ⟨G.O.-E.⟩— Lust., colorless, odorless scales w. bitter taste in aq. sol. — S. in 320 pt. c. aq., 17.5 pt. abs. alc., or 15.57 pt. eth. — Aq. sol. neut. to litmus. — Other reactions like these given under Sulphonal (No. **7**.830). — (Hypnotic drug.)
415	77	**Phenacyl Sulphide, $(Ph.CO.CH_2)_2S$.** — Colorless pr. fr. h. alc. — V.d.s. h. aq.; e.s. h. alc., chlf., bz. — Red. Fehling's sol. — Colors yel. in boiling w. alk. — Dioxime: cryst.; m.p. 151°.
420	77	**1,3,5-Trimethylbenzenesulphonic Ac., $Me_3.C_6H_2.SO_3H.2H_2O$.** — ⟨G.O.-D, E,F.⟩ — (Fr. mesitylene). — Cryst. aq. lost over H_2SO_4. — $Ba\bar{A}_2.9H_2O$: tbl.; s. in 15 pt. c. aq. — Chloride: m.p. 57°. — Amide: m.p. 141–2°; s. in 185 pt. h. aq.
425	77–8	**1,3-Dimethylbenzene-4-sulphinic Ac., $Me_2.C_6H_3.SO_2H$.** — ⟨G.O.-E.⟩ — Ndl. fr. aq.
430	78	**Methyl α-Naphthalenesulphonic Ac., $C_{10}H_7.SO_3Me$.** — ⟨G.O.-E.⟩ — B.p. 214° (15). — Trimet. tbl. fr. meth. alc. + ac.-eth.
435	80	**o-Toluenesulphinic Ac., $Me.C_6H_4.SO_2H$.** — ⟨G.O.-E.⟩ — Long ndl. — E.s. aq. — $Ba\bar{A}_2.3H_2O$: e.s. aq.
440	80	**Ethionic Ac., Anhydr., "Carbyl Sulphate," $\ulcorner O.SO_2.CH_2.CH_2.O.SO_2\urcorner$.** — (Fr. SO_3 & ethylene or abs. alc.). — Radiating cryst., deliquescing in air to unstable ethionic ac., (m.p. unknown).
445	80	**Di-n-heptylsulphone, $(C_7H_{15})_2.SO_2$.** — ⟨*⟩ — Lft. fr. alc. — V.d.s. eth.; e.s. chlf.
450	80	**Phenyl-m-xylylsulphone, $Ph.SO_2.C_6H_3Me_2$.** — ⟨*⟩ — Ndl. — Dist. — E.s. alc., eth.
455	80	**Cinnamothienylketone, $Ph.CH:CH.CO.C_4H_3S$.** — Ndl. — Alm. i. c. aq., lgr.; d.s. c. alc.; v.s. eth., chlf. — In chlf. sol. w. Br gives dibromide: lft. fr. alc.; m.p. 157°.
460	83–4	**Benzenesulphinic Ac., $C_6H_5SO_2H$.** — ⟨G.O.-D,E.⟩ — Dec. a. 100°. — Pr. fr. aq. — Reacts strongly acid. — D.s. c. aq., e.s. h.; e.s. alc., eth. — E. oxid. to benzenesulphonic ac. — (Slowly decd. by aq. to benzenesulphonic ac. and phenyl thiobenzenesulphonate). — NaOH fusion gives Na_2SO_3 & C_6H_6. — H_2S passed into conc. alc. sol. gives phenyl tetrasulphide. — $Na\bar{A}.2H_2O$: thin tbl.
465	83	**1,2-Dimethylbenzene-4-sulphinic Ac., $Me_2.C_6H_3SO_2H$.** — ⟨G.O.-D,E.⟩ — Lft. fr. aq.
470	83	**Trimethylene Tetrasulphide, $C_3H_6S_4$.** — Ndl. fr. warm alc. — S. alc., eth.; v.s. chlf., bz. — (Fr. formic ald., H_2S & HCl).

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — SULPHUR — SOLIDS.
475	84–6; abt. 75	**Sulphoacetic Ac., $HSO_3.CH_2.CO_2H.H_2O$.** — ⟨G.O.-D,E.⟩ — Deliq. cryst. — Loses aq. @ 160°, darkening. — Dec. to SO_2 & ac. ac. above 200°.
480	84–5	**α-Naphthalenesulphinic Ac., $C_{10}H_7.SO_2H$.** — ⟨G.O.-D,E.⟩ — Lust. scales or ndl. — D.s. in aq. cont. HCl; mod. s. alc.; d.s. eth. — Sol. in conc. H_2SO_4 slowly colors blue, then olive green! — Boiled w. aq. gives α-napthalenesulphonic ac. & $C_{10}H_7.SO_2.S.C_{10}H_7$. — Dil. HCl @ 180° gives SO_2 & naphthalene. — Ag$\bar{A}$: scales.; e.s. alc.
485	85	**p-Toluenesulphinic Ac., $Me.C_6H_4.SO_2H$.** — ⟨G.O.-D,E.⟩ — Thin tbl. — D. s. c. aq.; e.s. alc., eth., bz. — Deliq. in air giving corresp. sulphonic ac. — Ba$\bar{A}_2$: sm. lft.; i. c. aq.
490	80–90 (sinters)	**Polym. Thiobenzaldehyde, $(C_7H_6S)_x$.** — (Fr. H_2S & benzaldehyde). — White powd. — I. aq., c. alc.; e.s. chlf., bz. — Heated w. much Cu powd. gives stilbene & CuS easily.
495	85; 89	**Tetronal, 3,3-Bisethylsulphonepentane, $Et.C(SO_2Et)_2.Et$.** — ⟨G.O.-E.⟩ — Lust. tbl. or lft. fr. aq. — S. in 450 pt. c. aq., more s. h.; s. 18.5 pt. alc.; s. eth. — Similar to sulphonal (No. **7**.830) in reactions. (Neut. and stable.)
500	85	**Methylene-bis-isobutylsulphone, $CH_2(SO_2.CH_2.CHMe_2)_2$.** — ⟨*⟩ — Cryst. I. c. aq.; s. alc., eth., chlf., bz.
505	85–90	**α-Naphthalenesulphonic Ac., $C_{10}H_7.SO_3H.H_2O$.** — ⟨G.O.-D,E,F.⟩ — Deliq. cryst. — E.s. aq.; s. alc.; d.s. eth. — Ba$\bar{A}_2.H_2O$: lft.; s. in 87 pt. aq., or 350 pt. alc. (10°); 100 pt. boiling aq. dis. 4.76 pt. — Me$\bar{A}$: m.p. 78°. — (Et$\bar{A}$: liq.). — Chloride: m.p. 66°, 68°; alm. i. lgr. — Amide: m.p. 150°; c.s. alc., eth.
510	87–8	**2,2^1-Dithienylketone, Thienone, $(C_4H_3S)_2CO$.** — B.p. 326°. — Narrow tbl. fr. alc. — E.s. h. alc. — W. phenylhydrazine gives deriv. of m.p. 137°.
515	86–7	**Methyl-p-tolylsulphone, $Me.SO_2.C_6H_4Me$.** — ⟨*⟩ — Lust. ndl. fr. v. dil. alc. — E.s. h. aq.; more s. alc.
520	86–7; 87–90	**1,2,4-Trimethylthiophenol-(5), $Me_3.C_6H_2.SH$.** — ⟨T. **4**.13⟩ — Lft. fr. alc. — Ag$\bar{A}_2$: ndl. fr. alc.
525	88	**Methylphenylsulphone, $Me.SO_2.C_6H_5$.** — ⟨*⟩ — Large monoclin. tbl. fr. h. aq. — I. c. aq.; e.s. alc., bz.
530	88–90	**1-Methyl-3-isopropylbenzene-6-sulphonic Ac., $Me,C_3H_7.C_6H_3.SO_3H$.** — ⟨G.O.-D,E,F.⟩ — Deliq. pearly lft. — (Chloride: liq.) — Amide: lust. lft. fr. aq.; d.s. h. aq.; s. lgr.; m.p. 73°.
531	89	**2-Naphthol-7-sulphonic Ac., $HO.C_{10}H_6.SO_3H$.** — ⟨G.O.-D,E.⟩ — (Dried over KOH). — Cryst. w. aq. fr. conc. HCl. — W. dil. min. acids above 200° dec. to β-naphthol & H_2SO_4.
532	88–9	**Ethyl-α-naphthylsulphone, $Et.SO_2.C_{10}H_7$.** — ⟨*⟩ — Ndl. fr. alc. — E.s. alc., bz.
535	90–90.5	**3-(β)-Phenylthiophene, $Ph.C_4H_3S$.** — B.p. 254–60°. — Lft. fr. pet.-eth. — Vol. w. st.
540	91; 85	**α-Naphthyl Disulphide, $(C_{10}H_7)_2S_2$.** — Cryst. — D.s. alc.; e.s. eth.
545	91.5	**α-Thienylglyoxylic Ac., $C_4H_3S.CO.CO_2H$.** — ⟨G.O.-D.⟩ — Cryst. w. 1 H_2O (m.p. 58–9°) lost over H_2SO_4. — E.s. aq.; s. eth. — Heat dec. to CO_2 & α-thiophenealdehyde (benzaldehyde odor). — Heated w. dimethylaniline & fused $ZnCl_2$ gives green mass! — Ba$\bar{A}_2.H_2O$: ndl.; e.s. aq.
550	92	**p-Toluenesulphonic Ac., $Me.C_6H_4.SO_3H.4H_2O$.** — ⟨G.O.-D,E,F.⟩. — Cryst. — E.s. aq. — Chloride: m.p. 69°. — Amide: m.p. 137°; s. in 515 pt. c. aq. — KOH fusion gives p-cresol & p-oxybenzoic ac. — Ba$\bar{A}_2$: s. in 4 8 pt. aq. (12°); cryst. above 30° anhydr., below 30° w. $3H_2O$. — Et$\bar{A}$: m.p. 32–3°.
555	92	**Di-p-tolylsulphoxide, $(C_7H_7)_2SO$.** — ⟨*⟩ — Cryst. fr. lgr. — V.s. alc., eth., chlf.; d.s. c. lgr.
565	94.5	**Myricylmercaptan, $C_{30}H_{61}SH$.** — ⟨*⟩ — Amorph. yellowish powd. (Ann. **183**, 349).
570	94–5	**Phenyl p-Toluenesulphonate, $Me.C_6H_4.SO_3Ph$.** — ⟨*⟩ — Lust. cryst. fr. alc.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — SULPHUR. — SOLIDS.
575	95	**Trithiodilactylic Ac., $\mathrm{Me.CH(CO_2H).S_3.CH(CO_2H)Me}$.** — ⟨G.O.-D.⟩ — Scales fr. chlf. — E.s. h. aq.; v.s. alc., eth. — NaOH sol. splits off S.
580	97	**Biphenylene Sulphide, $\ulcorner\mathrm{C_6H_4.C_6H_4.S}\urcorner$.** — B.p. 332–3° (th.i.). — Long ndl. — E.s. h. alc.; v.s. eth., bz. — (Fr. phenyl sulphide in red hot tube).
585	98–9	**1,3,5-Trimethyl-2-sulphinic Ac., $\mathrm{Me_3.C_6H_2.SO_2H}$.** — ⟨G.O.-D,E.⟩ — Ndl. — AgĀ.
590	98	**Dithiohydroquinone, p-$\mathrm{C_6H_4.(SH)_2}$.** — ⟨T. **4**.13⟩ — Lft. — In air slowly oxid. to i. p-phenylenedisulphide. — Pb comp., or.-red ppt.
595	98	**Duplodithioacetone, $\mathrm{(C_3H_6S_2)_2}$.** — B.p. 243° d. (unc.). — Lust. tetrag. cryst. fr. chlf. — Odor offensive! — I. aq.; s. alc., eth., chlf., bz., etc. — Vol. w. st. — (Fr. acetone & yel. ammon. sulph.).
600	100; 107–8	**Di-thio-di-glycollic Ac., Acetic Ac. Disulphide, $\mathrm{[\text{-}SCH_2.CO_2H]_2}$.** — ⟨G.O.-D.⟩ — Cryst. fr. aq. — V.s. aq., alc., eth.; d.s. bz. — $\mathrm{KMnO_4}$ oxid smoothly to sulphoacetic ac. — Salts: e.s., not crystg. well.
605	99.5–100.5	**Phenyl-α-naphthylsulphone, $\mathrm{Ph.SO_2.C_{10}H_7}$.** — ⟨*⟩ — Cryst. fr. alc. — D.s. c. alc., eth.; v.s. h. bz.
610	100–1	**β-Naphthyl Tetrasulphide, $\mathrm{(C_{10}H_7)_2S_4}$.** — Pale yel. powd. fr. gl. ac. ac.
615	101	**α-Trithioacetic Aldehyde, $\mathrm{(C_2H_4S)_3}$.** — B.p. 246–7°. — Cryst. well from acetone. — Odorless. — Oxidn. in bz. sol. by $\mathrm{KMnO_4}$ (Ber. **22,** 2606) gives corresp trisulphone: v.d.s. eth., bz.; sbl. a. 340°.
620	102; 98	**Ethylbenzene-sulphone, $\mathrm{(Et.C_6H_4)_2.SO_2}$.** — ⟨*⟩ — 6-sided lft. fr. alc. — E.s. eth., bz., chlf.; less s. alc.; alm. i. lgr.
625	102	**α-Naphthyl Tetrasulphide, $\mathrm{(C_{10}H_7)_2S_4}$.** — Rhomb. yel. cryst. fr. gl. ac. ac. — I. aq.; s. chlf.; c.s. bz.
627	102–3	**Methyl-α-naphthylsulphone, $\mathrm{Me.SO_2.C_{10}H_7}$.** — ⟨*⟩ — Tbl. fr. ac.-eth. + alc. — E.s. h. alc., bz.
630	104c.	**Ethanedisulphonic-(1,2) Ac., $\mathrm{HSO_3.CH_2.CH_2.HSO_3}$.** — ⟨G.O.-D,E,F.⟩ — V. de-liq. cryst. mass. — E. s. alc. — Cryst. w. 1 $\mathrm{H_2O}$, lost @ 100°. — NaOH fusion gives acetylene, $\mathrm{H_2}$ & $\mathrm{Na_2SO_3}$! — Acid Chloride: (Fr. K salt & $\mathrm{2PCl_5}$); ndl. fr. eth.; m.p. 91°, 98°. — BaĀ: fr. h. sol. in fine pr.; e.s. aq. Also cryst. w. $\mathrm{2H_2O}$ in less s. rhombic octahedra.
635	104	**Methylene-bis-ethylsulphone, $\mathrm{CH_2(SO_2Et)_2}$.** — ⟨*⟩ — Lft. fr. aq. — E.s. aq., alc., bz.; d.s. eth.
640	105	**β-Naphthalenesulphinic Ac., $\mathrm{C_{10}H_7.SO_2H}$.** — ⟨G.O.-D,E.⟩ — Microcryst. powd. — Dil. HCl @ 150° dec. to $\mathrm{SO_2}$ & naphthalene. — Sol. in conc. $\mathrm{H_2SO_4}$ slowly colors green.
645	105–7	**β-Naphthyl Benzenesulphonate, $\mathrm{PhSO_3.C_{10}H_7}$.** — ⟨*⟩.
650	106–7	**1-Naphthol-8-sulphonic Ac., $\mathrm{HO.C_{10}H_6.SO_3H.H_2O}$.** — ⟨G.O.-D,E.⟩ — Cryst. — V.s. aq. — First loses cryst. aq. @ 180°. — Gives transient dark green color with $\mathrm{FeCl_3}$. — $\mathrm{PbC_{10}H_6SO_4.3H_2O}$: powd. ppt. — $\mathrm{PCl_5}$ gives chlor-naphthosulton: m.p. 174–5°; yel. ndl. fr. alc.
655	106	**Diphenylmethyleneethylene Disulphide, $\mathrm{Ph_2.C : S_2 : C_2H_4}$.** — ⟨*⟩ — Tbl. fr. abs. alc.
660	106	**Diphenyl Thioncarbonate, $\mathrm{CS.(OPh)_2}$.** — B.p. 336–40° sl. d. — Lust. lft. fr. alc. — E.s. alc.
670	107–8	**Anhydrotriacetophenone Disulphide, $\mathrm{C_{24}H_{22}S_2}$.** — Ndl. fr. alc. — Turns blue in melting! — E.s. chlf., acetone; less s. alc. — (Fr. $\mathrm{H_2S}$, HCl & alc.-acetophenone sol.).
675	107–8	**1,2,4-Trimethyl-5-sulphinic Ac., $\mathrm{Me_3.C_6H_2.SO_2H}$.** — ⟨G.O.-D,E.⟩ — Ndl. fr. aq.
680	108–9	**β-Naphthyl Trisulphide, $\mathrm{(C_{10}H_7)_2S_3}$.** — Amorph. white powd. fr. gl. ac. ac. — I. aq.; s. bz.
685	109; 98	**Dimethylsulphone, $\mathrm{Me.SO_2.Me}$.** — ⟨*⟩ — B.p. 238° unchanged. — Lust. ndl. fr. alc. — S. aq. — Odorless.
687	abt. 110	**p-Benzenesulphoprotocatechuic Ald., $\mathrm{(PhSO_3).C_6H_3(OH)CHO}$.** — Cryst.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — SULPHUR. — SOLIDS.
		fr. toluene. — (Pat.) Heated w. NaOMe & MeOH gives vanillin, etc. — (Fr. protocatechuic ald. $PhSO_2Cl$ & alk.)
690	110	**α-Naphthyl Sulphide, $(C_{10}H_7)_2S$.** — ⟨*⟩ — B.p. 289–90° (15 mm.). — Long ndl. fr. alc. + CS_2. — V.d.s. alc.; e.s. CS_2, bz.
695	110–1	**Biphenylmercaptan, $C_{12}H_9SH$.** — ⟨*⟩ — Vol. w. st. — S. alc., eth.: more s. bz., CS_2; s. alk. — $Pb\bar{A}_2$: dark red-br. micro. cryst. ppt.
700	111–2	**Pseudocumene-5-sulphonic Ac., $Me_3.C_6H_2.SO_3H.2H_2O$.** — ⟨G.O.-D,E,F.⟩ — Cubes d.s. dil. H_2SO_4. — $Ba\bar{A}_2$: scales; 100 pt. aq. dis. 4.50 pt. @ 11.5°. — Chloride: m.p. 61°. — Amide: m.p. 181°; lft.; s. in 380 pt. h., or 7000 pt. c. aq.
705	111–2	**Diethylene Disulphide, $(C_2H_4)_2S_2$.** — B.p. 199–200°. — Cryst. fr. alc. or eth. — Sbl. easily. — Vol. w. st. — S. alc., eth., CS_2. — $C_4H_8S_2.HgCl_2$: cryst. ppt. on mixing alc. sol. of components; i. aq.
710	112	**Phenylsulphonacetic Ac., $PhSO_2.CH.CO_2H$.** — ⟨G.O.-D,E,F.⟩ — Tbl. fr. chlf. or alc. — Mod. s. aq., alc., eth. — Dec. a. 160° to CO_2 & methyl benzenesulphinate. — $Ba\bar{A}_2$. 2Aq: glassy ndl.; e.s. h. aq. — Chloride: ndl.; m.p. 58°.
715	112.5–3	**Tetrasulphideacetic Ac., $S_4.(CH_2.CO_2H)_2$.** — ⟨G.O.-D.⟩ — Ndl. fr. eth. + CS_2. — Aq. sol. dec. on warming, quantitatively, to disulphide ac. ac. & S!
720	110–20	**1-Naphthol-5-sulphonic Ac., $HO.C_{10}H_6.SO_3H$.** — ⟨G.O.-D,E.⟩ — Indistinctly cryst. — Deliq. — $Zn\bar{A}_2.8\frac{1}{2}aq.$: v.s. lancet ndl. & "suitable for purification of ac."
725	115	**Pseudocumyl Disulphide, $(Me_3.C_6H_2)S_2$, ($Me_3 : S = 1,2,4 : 5$).** — Cryst.
730	115–7	**Phloroglucinol Benzenesulphonate, $C_6H_3(SO_3Ph)_3$.** — ⟨G.O.-E.⟩.
735	117	**β-Sulphydrylthiocinnamic Ac. Disulphide, ⌜S.CO.CH : CPhS⌝.** — Yellowish lft. — D.s. c. alc.; e.s. bz., eth., h. alc.; v.d.s. aq. — Boiled w. aq. splits off H_2S & S. — Distn. w. KOH sol. gives acetophenone (Vol. I). — (Fr. S & ethyl cinnamate, D.R.P. Frdl. IV, 1328.)
740	117–8	**2,5-Dimethythiophene-3-carbonic Ac., p-Thioxenecarbonic Ac., $Me_2.C_4HS.CO_2H$.** — ⟨G.O.-D.⟩ — Ndl. fr. aq. — Br-aq. gives monobrom deriv.: cryst. fr. bz.; m.p. 188-9°.
745	118	**β,β-Bis-methylsulphonepropane, $Me_2C.(SO_2.Me)_2$.** — ⟨*⟩ — Tbl. fr. aq. — S. in 140 pt. c. aq.
750	119–20	**2,4-Diphenylthiophene, $Ph_2.C_4H_2S$.** — ⟨*⟩ — Lust. tbl. fr. alc. — E.s. chlf., acetone, gl. ac. ac. — (Fr. cinnamic ac. + S @ 240°.).
755	120	**5-Sulpho-salicylic Ac., $(HSO_3)(HO).C_6H_3.CO_2H$, ($CO_2H : HO = 1 : 2$).** — ⟨G.O.-D,E.⟩ — Thin ndl. by slow evapn. of aq. sol. — Misc. aq. & alc. in all proportions. — V. stable. — Not at. by h. HNO_3. — $FeCl_3$ gives intense red-violet color! — Ⓓ. Boil 0.1 g. for 10 min. w. 3 cc. conc. HCl + 1 cc. conc. HNO_3. Cool. Filter off ppt. after cooling. Boil w. 5 cc. alc. Cool. Filter off cryst. yel. scales. Wash w. c. alc. Dry. The product (chloranil) heated over v. small flame in 3 inch t.t. sbl. in fine yel. cryst. wh. give deep blue sol. ("methyl violet") when mixed w.c. dimethylaniline. — Fusion w. KOH gives phenol & salicylic ac. (Vol. I.) — $Ba\bar{A}.3H_2O$: 6-sided pr.; e.s. aq.; i. alc.
760	120	**Diphenylsulphonemethane, $CH_2(SO_2.C_6H_5)_2$.** — ⟨*⟩ — Ndl. fr. alc.
765	121	**Thionaphthenequinone, ⌜C_6H_4.CO.CO.S⌝.** — ⟨G.O.-A.⟩ — Compact *intensely yel.* pr.! B.p. abt. 247° sl. d. — E. vol. st. w. sweetish odor. — S.h. aq. — Shaken w. bz. + trace of thiophene & conc. H_2SO_4 gives intense blue sol. — Warm dil. NaOH gives gold-yel. sol. fr. wh. C. is repptd. by acid.
	81	**β-Thionaphthol, $C_{10}H_7SH$.** — ⟨T.4.13⟩ — B.p. 286°, 288° sl.d. — Lust. scales fr. alc. — Little vol. w. st. — $Pb\bar{A}_2$: or.-yel. cryst. powd.
770	122	**2-Naphthol-6-sulphonic Ac. $HO.C_6H_6.SO_3H$.** — ⟨G.O.-D,E.⟩ — Leafy cryst. e.s. aq., alc. — Aq. sol. gives pale green color w. $FeCl_3$. — $Ba\bar{A}_2.6H_2O$: lft.; e.s. aq.; less s. alc.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENT" — SULPHUR. — SOLIDS.
775	122	**Trithioacetophenone,** $((Me)(C_6H_5)C.)_3S_3$. — Ndl. fr. alc. — D.s. alc.; i. aq.; e.s. eth., chlf. — Decd. by heat to H_2S, etc.
780	122	**α,α-Bismethylsulphoneethane,** $Me.CH(SO_2.Me)_2$. — ⟨*⟩ — Cryst. — S. in 140 pt. c. aq.
785	122.5–3	**Di-α,β-naphthylsulphone,** $(C_{10}H_7)_2SO_2$. — ⟨*⟩.
	122.5–3.5	**Diphenylsulphone,** (Cf. No. **7**.850).
795	123.5–4	**Trisulphideacetic Ac.,** $S_3.(CH_2.CO_2H)_2$. — ⟨G.O.-D.⟩ — Lft. fr. aq. — Soon dec. in aq. sol. w. sepn. of S.
800	123–4	**Benzylidenedithioglycollic Ac.,** $Ph.CH.(S.CH_2.CO_2H)_2$. — ⟨G.O.-D.⟩ — Ndl. fr. aq. — $KMnO_4$ oxid. to benzylidenedimethylsulphone, m.p. 162–3° (No. **7**.1065).
805	123	**Methyl Anthraquinonesulphonate-(2),** $C_{14}H_7O_2.SO_3Me$. — ⟨*⟩ — Sm. wh. lft. — E.s. alc., eth., chlf.; alm. i. lgr. (aq. or alc. dec. to free ac.) — (Can only be prepared fr. chloride by use of Krafft-Roos method, cf. Ber. **28**, 2261.)
810	124.5	**Phenyl-p-tolylsulphone,** $C_6H_5.SO_2.C_7H_7$. — ⟨*⟩ — Rhomb. tbl. fr. alc. — 100 pt. abs. alc. dis. 1.62 pt. (20°). — Mod. s. bz., gl. ac. ac.
815	125	**Ethyl Anthraquinonesulphonate-(2),** $C_{14}H_7O_2.SO_3Me$. — ⟨*⟩ — Similar to methyl ester above.
820	125	**α-Thiodilactylic Ac.,** $Me(CO_2H).CH.S.CH.(CO_2H)Me$. — ⟨G.O.-D.⟩ — Pr. — E.s. aq., alc., eth. — Oxidn. by dil. HNO_3 gives α-sulphodipropionic ac.: cryst.; v.s. aq.; m.p. 155–6°.
825	125–6	**β-Trithioacetic Aldehyde,** $(C_2H_4S)_3$. — B.p. 245–8° sl. d. — Odorless. — Lust. ndl. fr. gl. ac. ac. — Vol. w. st. — Oxidn. in bz. sol. by $KMnO_4$ (Ber. **22**, 2606) gives a charac. trisulphone.
830	125–6; 127–8c. Sbl. in vac. @ 105–6	**Sulphonal, Bisethylsulphone-dimethylmethane,** $Me_2C.(SO_2Et)_2$. (Hypnotic drug). — ⟨G.O.-E.⟩ — B.p. abt. 300° sl. d. — Colorless, odorless, nearly tasteless pr. — S. in 500 pt. c. aq., or 15 pt. boiling aq.; s. 65 pt. c. or 2 pt. boiling alc.; s. 133 pt. eth. (15°).; mod. s. chlf., bz.; e.s. conc. H_2SO_4 & repptd. unchanged by aq. — Not decd. by boiling NaOH sol. or short warming w. conc. H_2SO_4, HNO_3, Br, or $KMnO_4$ sol. — Heated w. Na, or w. equal wt. powd. charcoal in dry t.t. gives unpleasant odor of mercaptan! — (Sat. aq. sol. neut. to litmus.)
835	126.5	**α-Thiophenecarbonic Ac.,** $C_4H_3S.CO_2H$. — ⟨G.O.-D.⟩ — B.p. 260° c. (alm. undecd.) — Sbl. in flat ndl. — Vapors cause coughing. — E.s. alc., eth., h. aq.; mod. s. chlf.; d.s. lgr. — Heated w. isatine & oil of vit. gives blue sol.! — Ignition w. $Ca(OH)_2$ gives CO_2 & thiophene! — $Ca\bar{A}_2.3H_2O$: ndl.; (100 pt. aq. @ 18.5° dis. 18.5 pt. anhydrous salt). — $Et\bar{A}$: liq.; b.p. 218° c.; odor like ethyl benzoate. — Amide: m.p. 174°.
840	127	**Trithioanisic Ald.,** $(MeO.C_6H_4.CHS)_3$. — Small ndl. fr. alc. — E.s. bz.; v.d.s. gl. ac. ac., c. alc. — In bz. sol. w. little iodine gives β-modif. (No. **7**.1140), m.p. 183°, at once.
845	128	**Benzoyl Disulphide,** $(PhCO)_2S_2$. — Pr. or 6-sided tbl. fr. CS_2. — Becomes violet-red a few degrees above m.p. — I. aq., aq. ammon.; d.s. c. alc.; s. h. CS_2; less s. eth. — HNO_3 or aq.-KOH no action; alc.-KOH gives benzoic & thiolbenzoic acids.
850	128–9; 122.5–3.5	**Diphenylsulphone, Sulphobenzid,** $(C_6H_5)_2SO_2$. — ⟨*⟩ — B.p. 376.4° (722 mm.) — Monoclin. pr. fr. bz.; lft. fr. alc.; fine ndl. fr. h. aq. — I. c. aq.; d.s. h. aq., c. alc.; e.s. h. alc.; s. bz. — V. stable to oxid. agt. & boiling alk. — KOH fusion gives sulphite, phenol, etc. — Warmed w. fuming H_2SO_4 gives benzenesulphonic ac. — Unlike sulphonal, does not give mercaptan odor when warmed w. Na.
855	129.5; 128; 118–9	**o-Sulphobenzoic Anhydr.,** $\ulcorner SO_2.O.CO.C_6H_4 \urcorner$. — Monoclin. tbl. fr. bz. — I aq. — Dist. — Corresp. ac., m.p. 130°.
860	128	**α-Trithiofurfurol,** $(C_5H_4SO)_3$. — Cryst. fr. alc. — S. alc.; v.s. chlf., bz.
865	129	**Thiodiglycollic Ac., Acetic Ac. Sulphide,** $S(CH_2.CO_2H)_2$. — ⟨G.O.-D.⟩ — Rhomb. tbl. — S. in 2.37 pt. aq. @ 18°.; e.s. alc. — $Pb\bar{A}$: cryst. ppt.; lft. fr. boiling aq. — Boiled w. x.s. acetyl chloride gives anhydride: ndl. fr. chlf.; m.p. 102°. — (Esters oils.)

No.	Melting-point (C.°)	"ADDITIONAL ELEMENT" — SULPHUR. — SOLIDS.
870	132–3	**3,3-Bis-(methylsulphone)-pentane, $Et_2.C(SO_2Me)_2$.** — ⟨*⟩ — Cryst. fr. aq. — S. in 850 pt. aq. @ 15°, or in 20 pt. @ 100°. — Action like sulphonal.
875	133; 130	**Benzylsulphoxide, $(Ph.CH_2)_2SO$.** — ⟨*⟩ — Lft. — I. c. aq.; s. h. aq.; v.s. alc., eth. — Boiled w. HNO_3 (sp. gr. 1.3) gives benzoic & sulphuric ac.
880	134; 130	**o-Sulphobenzoic Ac., $HSO_3.C_6H_4.CO_2H$.** — ⟨G.O.-D,E.⟩ — Cryst. w. $3H_2O$ in trimet. ndl., m.p. 69°. — S. in 2 pt. c. aq.; v.d.s. abs. alc.; i. eth. — KOH fusion gives salicylic ac. easily! — Treat w. x.s. acetyl chloride, finally warming to complete reaction. On cooling clear sol. the anhydride ⌜$C_6H_4.SO_2.CO.O$⌝ separates in monoclin. tbl. — Recryst. fr. dry bz., monoclin. tbl., m.p. 118–9° (Ber. **22**, 757).
885	133–4	**Dibenzenesulphonyl Sulphide, $(PhSO_2)_2S$.** — Monoclin. cryst. fr. gl. ac. ac. — I. lgr. — Zn + HCl red. to thiophenol.
890	133–4	**Di-p-toluenesulphonyl Sulphide, $(Me.C_6H_4.SO_2)_2S$.** — Monoclin. tbl. fr. lgr. — Zn + HCl red. to p-thiocresol.
895	133	**p-Benzoyldiphenylsulphone, $Ph.CO.C_6H_4.CO.Ph$.** — ⟨*⟩ — Ndl. fr. alc. — Sol. undecd. in conc. H_2SO_4 or HNO_3. — E.s. bz., warm eth.; v.s. h. alc.
900	133–4	**Benzylidenediethylsulphone, $Ph.CH.(SO_2Et)_2$.** — ⟨*⟩ — Ndl. fr. aq. — Alm. i. c. aq.; s. alk.
905	134–5	**o-Tolylsulphone, $(C_7H_7)_2SO_2$.** — ⟨*⟩ — Ndl. fr. alc.
910	135	**Pentacarbon Disulphide, C_5S_2.** — *Red-brown.* — Amorphous. — I. alc., eth., CS_2. — Sol. undecd. w. red color in alk. or ammon.!
915	136	**3-β-Thiophenecarbonic Ac., $C_4H_3S.CO_2H$.** — ⟨G.O.-D,E,F.⟩ — Ndl. fr. h. aq. — E. vol. w. st. — Gives "indophenine react." (Cf. No. **2**.3633) w. isatine oil of vit. — $Ca\bar{A}_2.xH_2O$: 100 pt. aq. @ 14.5° dis. 7.92 pt. dry salt. — $Ag\bar{A}$: lust. lft.; d.s. aq. — Amide: ndl. fr. eth.; m.p. 178°.
920	138–40	**4-Sulphophthalic Ac., $HSO_3.C_6H_3.(CO_2H)_2.H_2O$.** — ⟨G.O.-D,E.⟩ — Melts w. loss of aq. — At 180° gives an anhydr.
925	139	**Benzophenonephenylmercaptol, $Ph_2.C(S.Ph)_2$.** — Short lust. pr. fr. eth. — D.s. alc., eth.
930	139	**β,β-Naphthyl Disulphide, $(C_{10}H_7)_2.S$.** — ⟨*⟩ — Ndl.
935	140–2	**Pyrogallyl Benzenesulphonate, $C_6H_3(SO_3Ph)_3$.** — ⟨*⟩.
940	141–2	**(α-modif.)α-Dithiodilactylic Ac., $(CO_2H.CHMe.S\text{-})_2$.** — ⟨G.O.-D.⟩ — Ndl. — S. in 6.67 pt. aq. @ 14°; e.s. alc., eth., h. aq. — (A β-modif. sol. in 2.438 pt. aq. @ 14° melts at 109°.)
945	142; 137	**2-Methylthiophene-5-carbonic Ac., $Me.C_4H_2S.CO_2H$.** — ⟨G.O.-D.⟩ — Ndl. fr. eth. — Sbl. in long ndl. — E.s. h. aq., alc. — (Gives no color w. isatine & sulph. ac.). — (Alk. $KMnO_4$ oxid. to corresp. dicarbonic ac.)
950	144; 140	**2-Methylthiophene-3-carbonic Ac., $Me.C_4H_2S.CO_2H$.** — ⟨G.O.-D.⟩ — Ndl. fr. aq. — E.s. h. aq., alc. — ($KMnO_4$ gives no dicarbonic ac.)
955	140–50	**Fluorescein Sulphate, $C_{20}H_{12}O_5SO_3$.** — *Yel.-red* pr. — R. unstable. — H. aq. or alk. dec. at once to H_2SO_4 & fluorescein. — (Fr. fluorescein & oil of vit. @ 100°.)
960	145	**Polymeric Diethylene Disulphide, $(C_2H_4S)_x$.** — Amorph. powd. — I. alc., eth., CS_2. — (Heated alone or w. solvent at 160° depolymerizes to diethylene disulphide.)
965	145–6 (browning)	**Disulphosalicylic Ac., $(HSO_3)(HO).C_6H_2.CO_2H$.** — ⟨G.O.-D,E.⟩ — Cryst. w. $4H_2O$ in deliq. ndl., m.p. 80°. — V.s. aq., alc.; less s. eth. — $FeCl_3$ colors wine-red. — KOH-fusion gives phenol & salicylic ac. (Vol. I.) — $Ba_3\bar{A}_2.6\frac{1}{2}H_2O$: pr.; 100 pt. aq. dis. 2 pt.; i. alc.
970	146–7	**3-Thiolbenzoic Ac., $HS.C_6H_4.CO_2H$.** — ⟨G.O.-D.⟩ — Colorless lft. — Oxid. in moist air on addit. of Br-aq. to sol. to corresp. disulphide: ndl.; m.p. 242–4°; d.s. h. aq.
975	146.5	**Polym. Thiobenzophenone, $(Ph_2CS)_4$.** — Ndl. fr. eth. — Oxidn. w. CrO_3 in gl. ac. ac. gives benzophenone (Vol. I).
980	147	**Trithienyl, $C_4H_2S(C_4H_3S)_2$.** — B.p. 357°. — Yellowish ndl. — Not at. by

No.	Melting-point (C.°)	" ADDITIONAL ELEMENT " — SULPHUR. — SOLIDS.
		$KMnO_4$. — Warmed w. Br + gl. ac. ac. gives tribrom deriv.: ndl.; i. alc.; s. bz.; m.p. 282° (Bl [3] **6,** 194). — (Fr. benzene + S in red-hot tube.)
985	147	**Triethyl 1,3,5-Benzenetrisulphonate,** $C_6H_3(SO_3Et)_3$. — ⟨*⟩ — Triclin. cryst. fr. bz. — I. lgr.; s. eth., chlf. — (Corresp. acid unknown). — Corresp. amide melts at 310–15°.
990	148	**Phenylbenzylsulphone,** $Ph.SO_2.C_7H_7$. — ⟨*⟩ — Sol. @ 20° in 60 pt., or in 7 pt. boiling alc.; d.s. eth., bz.
995	148–50	**Biphenyl Disulphide,** $(C_{12}H_9)_2S_2$. — ⟨*⟩ — Flat ndl. fr. gl. ac. ac. — Mod. s. alc., CS_2; less s. eth., gl. ac. ac.; i. alk.
1005	150	**Benzylsulphone,** $(Ph.CH_2)_2SO_2$. — ⟨*⟩ — Flat ndl. — D.s. c. alc., e.s. h.; e.s. bz., gl. ac. ac. — Oxid. agts. give benzoic & sulphuric ac. easily.
1010	150; 151–1.5; 140	**p-Dihydroxythiobenzene, p-Di-hydroxphenylsulphide,** $(HO.C_6H_4)_2S$. — Silvery lft. fr. c. alc. — V.d s. c. aq.; e.s. alc., eth., KOH; d.s. CS_2. — Pptd. by CO_2 fr. alk. sol. — Diacetate, (fr. ac. anhydr. + $Na\bar{A}$): cryst. fr. alc.; m.p. 92–94°.
1012	150–1	**p-Dihydroxydiphenyl Disulphide,** $(HO.C_6H_4)_2S_2$. — Ndl. fr. aq. — V.s. alc., eth.; s. dil. NaOH & repptd. by CO_2. — Diacetate: pearly lft. fr. alc.; m.p. 88–9°.
1015	151	**Di-β,β-naphthyl Sulphide,** $(C_{10}H_7)_2S$. — ⟨*⟩ — B.p. 295–6° (15 mm.). — Thin lust. lft. fr. h. alc. — V.d.s. h. alc.; e.s. CS_2.
1020	150–3	**Methanetrisulphonic Ac.,** $CH(SO_3H)_3 + 4H_2O$ (?). — ⟨G.O.-D,E.⟩ — Colorless v. hygroscopic ndl. — V.s. aq., alc. — Strong tribasic ac. — $Ba_3\bar{A}_2 + 9H_2O$: d.s. lft. or ndl.
1025	152–3	**2,5-Diphenylthiophene,** $Ph_2.C_4H_2S$. — Lust. lft. fr. alc. — Dist. undecd. — E.s. alc. — (Fr. styrene + S @ 230°.)
1030	154	**1-Naphthol-8-sulphonic Ac. Anhydr. (Naphthosulton),** $\ulcorner C_{10}H_6.SO_2.O \urcorner$. — Broad glassy pr. fr. bz. — Dist. alm. undecd. a. 360°. — D.s. alc.; e.s. bz.; v.s. chlf. — Dis. slowly in h. conc. NaOH giving salt of corresp. sulphonic ac. (m.p. 106–7°).
1035	154–5	**β-Dithiodilactylic Ac.,** $[CO_2H.CH_2.CH_2.S\text{-}]_2$. — ⟨G.O.-D.⟩ — Silvery lft. — S. in abt. 1000 pt. c. aq.
1040	154–5; 158–9	**Diphenylene Disulphide, Thianthrene,** $\ulcorner C_6H_4.S.S.C_6H_4 \urcorner$. — B.p. 360°, 364–6°, 353–4° sl. d. — Monoclin. pr. fr. alc. — I. aq.; s. in 400 pt. c. alc.; mod. s. eth., bz., CS_2; s. warm oil of vit. w. intense violet color! — (Fr.: dry distn. of Na benzene sulphonate; phenol & P_2S_5; C_6H_6, sulphur chloride & $AlCl_3$; bz. + S + $AlCl_3$.)
1045	155	**Dehydrodioxydi-β-naphthyl Sulphide,** $C_{20}H_{12}O_2S$. — *Red* cryst. fr. eth. — E.s. conc. H_2SO_4 w. dark blue color! — (Pat. Frdl. **III,** 990.)
1050	abt. 155 w. gas evol.	**Methylene Sulphate,** $CH_2.SO_4$. — Odorless white powd. — I. aq., alc., eth., chlf., bz.; s. acetone.
1055	156	**Xanthion,** $\ulcorner O.C_6H_4.CS.C_6H_4 \urcorner$. — *Red* or *yel.* ndl. fr. alc. — D.s. alc.; e.s. eth., bz. — Sol. in alc. green w. strong red fluoresc.! — Boiling w. alc.-KOH gives xanthone (Vol. I).
1060	158	**Di-p-tolylsulphone, Sulphotoluid,** $(Me.C_6H_4)_2.SO_2$. — ⟨*⟩ — B.p. 404.6–405.2° (713.9 mm., Crafts, Ber. **12,** 1177). — Pr. fr. bz. — D. s. c. alc., eth.; more s. h. alc., chlf., bz. — Decd. by KOH fusion to p-cresol, SO_2 & diphenyl (Ber. **19,** 2426). — (Fr. toluene & SO_3.)
1065	162–3	**Benzylidenedimethylsulphone,** $Ph.CH(SO_2Me)_2$. — ⟨*⟩ — Ndl. fr. alc. — E. s. h. aq.; i. eth.
1070	162; 164.5	**α-Dinaphthylsulphoxide,** $(C_{10}H_7)_2SO$. — ⟨*⟩ — Pr. fr. alc.
1075	163–4 (softening @ 158)	**Thiosalicylic Ac.,** $HS.C_6H_4.CO_2H$. — ⟨G.O.-D.⟩ — S.-yel. cryst. fr. alc. or gl. ac. ac. — Sbl. — D.s. h. aq.; e.s. alc. & gl. ac. ac. — $FeCl_3$ colors alc. sol. transient blue! — Sol. in conc. H_2SO_4 on heating becomes carmine red. — Oxid. easily to dithiosalicylic ac. (the disulphide), m.p. 289° (No. **7.1275**)
1080	167	**(α)-Trithiocinnamic Ac.,** $(Ph.CH : CH.CHS)_3$. — V.s. chlf., bz.; d.s. alc., gl. ac. ac. — (Fr. H_2S, cinnam. ald. & HCl.)

No.	Melting-point (C.°)	"ADDITIONAL ELEMENT" — SULPHUR. — SOLIDS.
1085	168–9	**Stilbene Sulphide, $C_{14}H_{12}S$.** — Ndl. — Unites w. picric ac. to unstable red ndl.
1090	169	**β-Naphthol Disulphide, $(HO.C_{10}H_6)_2S_2$.** — Thin S.-yel. ndl. fr. bz. — D.s. c. alc., bz., eth. — Dibenzyl deriv.: cryst. fr. bz.; v.d.s. alc.; m.p. 187°.
1095	abt. 170d. (w. gas evol.)	**1-Naphthol-4-sulphonic Ac., α-Naphtholsulphonic Acid N.W., $HO.C_{10}H_6.SO_3H$.** — ⟨G.O.-D,E.⟩ — Tbl. — V.e.s. aq. — $FeCl_3$ colors sol. transiently intense blue! — NaĀ: s. in 90% alc. — (Important dyestuff intermediate.)
1100	171	**Tetrathiopenton, $C_{15}H_{28}S_4$.** — Ndl. fr. alc. — Sbl. — I. aq.; mod. s. alc., eth. — (Fr. acetone, H_2S & HCl).
1105	171–2	**Biphenyl Sulphide, $(C_{12}H_9)_2S$.** — Lft. fr. gl. ac. ac. — Mod. s. alc., eth., CS_2, bz.
1110	175–6	**Thiometaformic Aldehyde, $(CH_2S)_x$.** — Powd. of peculiar odor! — I. in ord. solv. — (Fr. H_2S, NH_3 & hexamethylenetetramine.)
1115	177	**Di-β,β-naphthylsulphone, $(C_{10}H_7)_2SO_2$.** — ⟨*⟩ — Silky ndl. fr. h. alc. — D.s. alc., h. eth., c. bz., lgr.; mod. s. h. bz., gl. ac. ac. — S. w. sulphonation in h. conc. H_2SO_4.
1120	179.5–80	**Ethylenediphenyldisulphone, $(PhSO_2)_2.C_2H_4$.** — ⟨*⟩ — Cryst. fr. alc. — V.a.s. h. aq.; s. h. alc., bz.; v.s. h. gl. ac. ac. — (PCl_5 gives $PhSO_2Cl$ v. slowly.)
1125	180–1; 173–4	**Naphthalene-2,7-dithiol, $C_{10}H_6.(SH)_2$.** — ⟨T. **4**.13⟩ — B.p. 210° (15 mm.). — Pearly lft. fr. alc. — Sbl. in lust. scales. — V.d.s. c. alc., eth., lgr., toluene. — PbĀ: or.-yel. powd. — Diacetate: cryst.; m.p. 110°.
1130	181–2; 158	**3-Sulpho-p-toluic Ac., $MeC_6H_3.(HSO_3)(CO_2H)$.** — ⟨G.O.-D,E.⟩ — Cryst. w. $2H_2O$, lost @ 135°. — Pr. fr. aq. — D.s. eth., chlf., bz. — Chloride: m.p. 59°. — Amide: m.p. 186°; i. eth., chlf., bz.
1135	182	**Sulphondiacetic Ac., $(CO_2H.CH_2)_2SO_2$.** — ⟨G.O.-D.⟩ — Rhomb. tbl. — E.s. aq., alc.; less s. eth. — Dec. smoothly @ 200° to CO_2 & dimethylsulphone. — BaĀ + 1 or $5H_2O$: ndl.; d.s. aq.
1140	183	**β-Trithioanisic Ald., $((MeO).C_6H_4.CHS)_3$.** — Tbl. fr. gl. ac. ac. — Alm. i. c. bz. — Cryst. w. 1 mol. C_6H_6 fr. bz.
1145	183	**α-Trithiopiperonal, $[(CH_2O_2).C_6H_3.CHS]_3$.** — Ndl. fr. chlf. + alc. — D.s. alc., eth.; e.s. chlf., bz. — W. I in bz. yields β-deriv.: m.p. 236°.
1150	184	**Tetraphenylthiophene, Thionessal, Thiolepidene, $Ph_4.C_4S$.** — Odorless. — Ndl. fr. abs. alc. — Sbl. undecd. — V.d.s. alc.; s. eth., bz.; d.s. lgr. — Unchanged by h. alc.-KOH. — CrO_3 mixt. oxid. to benzoic ac. — Unchanged by fusion w. KOH. — Br-aq. gives (Ann. **144**, 194) tribromthionessal, m.p. 265–70°. — S. in conc. H_2SO_4 w. red color. — (Formed in many reactions.)
1155	184; 186	**2-Benzoyldiphenylsulphone, Benzoylsulphobenzid, $Ph.CO.C_6H_4.SO_2.Ph$.** — ⟨G.O.-E.⟩ — Lft. fr. alc., — E.s. bz. — Sbl. — *Not* at. by boiling alc.-KOH. — W. KOH @ 200° gives benzoic ac. & diphenylsulphone.
1160	186–7	**Benzophenonesulphone, ⌜$SO_2.(C_6H_4)_2.CO$⌝.** — Ndl. or pr. — E.s. alc., chlf., eth. — Alc.-KOH yields a blue sol.!
1165	187; 166; 123	**α-Dinaphthylsulphone, $(C_{10}H_7)_2SO_2$.** — ⟨*⟩ — Pr. fr. bz. — S. h. alc., eth., h. CS_2; e.s. h. bz.; v.d.s. lgr. — Not at. by CrO_3 mixt., but by CrO_3 in gl. ac. ac.
1167	d.w.m. 185–90	**2-Sulpho-p-toluic Ac., $Me.C_6H_3.(SO_3H)(CO_2H) + 2H_2O$.** — ⟨G.O.-D,E.⟩ — Loses 1 H_2O over H_2SO_4. — V.s. aq.; S. alc.; i. eth. — Amide: m.p. 228°; 218°.
1170	blackens @ 195	**Retene Disulphonic Ac., $C_{18}H_{16}(SO_3H)_2.10H_2O$.** — ⟨G.O.-D,E,F.⟩ — Ndl. — (Anhydrous comp.) — S. in 2–3 pt. c. aq.; v.s. alc.; i. eth. — BaĀ.$6H_2O$: pr.; s. in 60–61 pt. aq.; holds $1H_2O$ @ 100°. — Chloride: m.p. 175°.
1175	abt. 200d.	**p-Sulphobenzoic Ac., $HSO_3.C_6H_4.SO_2H$.** — ⟨G.O.-D,E.⟩ — Non-deliq. ndl. — BaĀ$_2$. 3Aq.: flat ndl.; v.d.s. c. aq. — NaĀ.$2\frac{1}{2}H_2O$ (dried over H_2SO_4), or, "contains $1H_2O$." — BaĀ.$2H_2O$: ndl.; mod. s. c. aq. — KOH fusion gives p-hydroxybenzoic ac.
1180	209	**Thioxanthone, ⌜$CO.C_6H_4.S.C_6H_4$⌝.** — B.p. 371–3° (715 mm.). — *Yel.* ndl.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENT" — SULPHUR. — SOLIDS.
		fr. chlf.! — E.s. h. gl. ac. ac., CS_2, bz. — Sbl. — Sol. in H_2SO_4 fluoresc. green! — Oxidn. yields benzophenonesulphone, No. **7**.1160.
1185	209	**Phenyldithienyl, $Ph.C_4H_2S.C_4H_3S$.** — ⟨*⟩ — **Lft.** fr. bz. — **Sbl.** — **Alm.** i. alc., eth., lgr.; e.s. h. bz. — Gives blue color w. isatine + conc. H_2SO_4. — (Fr. toluene & S.)
1190	210	β-**Trithiosalicylic Ald., $(HO.C_6H_4.CHS)_3$.** — **Fr.** alc. in clear lft. w. 3 mol. alc. of crystn. — Alm. i. bz.
1195	213	(β)-**Trithiocinnamic Ald., $(Ph.CH : CH.CS)_3$.** — Pr. fr. h. bz. — Alm. i. c. alc., bz., eth.; d.s. gl. ac. ac.
1200	abt. 215d.	**Dithioxanthone, $\ulcorner CS.C_6H_4.C_6H_4S \urcorner$.** — *Yel.* powd. — S. conc. H_2SO_4 w. red brown color & yel. fluoresc.! — V.d.s. alc.; e.s. chlf.
1205	215d.	β-**Trithio-4-hydroxybenzaldehyde, $(HO.C_6H_4.CHS)_3$.** — Cryst. fr. abs. alc. w. 3 mol. alc. — Cryst. fr. h. bz. w. 2 mol. C_6H_6. — Alm. i. c. bz. — Heated w. Fe gives p-dioxystilbene & FeS.
1210	215	β-**Naphthol Sulphide, $(HO.C_{10}H_6)_2.S$.** — Pr. fr. alc. — D.s. eth., bz.; more s. h. alc. — Oxidn. by dil. HNO_3 gives phthalic ac. — Na_2Ā.$6H_2O$: ndl.; e.s. c. aq.
1215	216	**Thioparaformaldehyde, Trithioformaldehyde, $(CH_2S)_3$.** — Colorless cryst. fr. bz., chlf., CS_2. — Odorless when pure. — Sbl. — I. c. aq.; d.s. alc., eth.; more s. chlf., CS_2; most s. bz. — Alc. $HgCl_2$ sol. gives ppt. of C̄.$HgCl_2$. — Oxidn. w. $KMnO_4$ (Ber. **23**, 69, 1874), gives trimethylene trisulphone: ndl. fr. h. aq.; sbl. above 340° w. melting; s. alk., h. aq.
1220	225–6d.	β-**Trithiobenzaldehyde, $(C_7H_6S)_3$.** — Ndl. — E.s. h. gl. ac. ac.; v.d.s. alc., bz., chlf. — Heated w. Cu powd. gives stilbene (Vol. I) and CuS! — Cryst. w. 1 mol. bz.
1225	229d.	β-**Trithiofurfurol, $(C_5H_4SO)_3$.** — Long ndl. fr. bz. — Alm. i. alc.; s. bz.; e.s. chlf.
1230	235–7d.	**Trithiovanillin, $[(MeO).C_6H_3(OH).CHS]_3$.** — Cryst. w. 2 mol. C_6H_6 fr. bz. — D.s. alc., bz., eth., gl. ac. ac.
1235	236 (reddening)	β-**Trithiopiperonal, $[(CH_2O_2)C_6H_3.CHS]_3$.** — Cryst. fr. bz. w. 2 C_6H_6 in ndl.
1237	239	**Oxysulphobenzid, $(HO.C_6H_4)_2SO_2$.** — ⟨G.O.-D,E.⟩ — Cryst. fr. aq. — Alm. i. c., e.s. h. aq.; e.s. alc., eth.; less s. bz.; e.s. alk.; dec. carbonates when heated. — Boiled w. KOH, MeOH, & MeI gives Me_2Ā: lft. fr. h. alc.; m.p. 130°; sbl.
1240	235–40; 243–4	**4-Sulphoisophthalic Ac., $HSO_3.C_6H_3(CO_2H)_2$.** — ⟨G.O.-D,E.⟩ — V. hygroscopic. V.s. aq. — BaĀ. w. 1,2,3 or $4H_2O$: 100 pt. aq. @ 23.5° dis. 2.073 pt.
1245	241	α-**Naphthol-3,8-disulphonic Anhydr., Naphthosultonsulphonic Ac., $HSO_3.\ulcorner O.C_{10}H_5(HSO_3) \urcorner$.** — ⟨G.O.-D,E.⟩ — Ndl. — NaĀ.$3H_2O$: s. in 83 pt. c. aq., quickly changed by alk. or alk. carb. to salt of the naphthodisulphonic ac.
1250	250	**2,4-Disulphoisophthalic Ac., $(HSO_3)_2.C_6H_2.(CO_2H)_2$.** — ⟨G.O.-D,E.⟩ — Gran. fr. alc.
1255	257–8 (r.h.)d.	**5-Sulphoisophthalic Ac., $HSO_3.C_6H_3(CO_2H)_2$.** — ⟨G.O.-D,E.⟩ — Deliq. ndl. — V.s. aq.; d.s. dil. H_2SO_4. — BaĀ$_2$.$8H_2O$: ndl.; e.s. aq.
1260	262	**Benzylidenediphenylsulphone, $PhCH.(SO_2Ph)_2$.** — ⟨*⟩ — Ndl. fr. alc.
1265	270d.	**2,3-Thiophenedicarbonic Ac., $C_4H_2S.(CO_2H)_2$.** — ⟨G.O.-D.⟩ — Long ndl. fr. aq. — Not vol. w. st. — D.s. c. aq.; e.s. eth. — Fusion w. resorcinol gives red-brown mass s. like fluorescein w. fine green fluorescence in NaOH sol. — BaĀ: glassy ndl.; d.s. c. aq. — Me_2Ā: lft. fr. alc.; m.p. 59.5°.
1270	d.280 part. sbl.	**2,4-Thiophenedicarbonic Ac., $C_4H_2S(CO_2H)_2$.** — ⟨G.O.-D.⟩ — D.s. c., e.s. h. aq. — Ag_2Ā: curdy ppt. — Me_2Ā: lft.; m.p. 120–1°.
1275	289; 288–90	**Dithiosalicylic Ac., $CO_2H.C_6H_4.S.S.C_6H_4.CO_2H$.** — ⟨G.O.-D,F.⟩ — **Pr.** fr. alc. — I. aq. — Oxidn. w. $KMnO_4$ or HNO_3 gives o-sulphobenzoic ac. —

No.	Melting-point (C.°)	"ADDITIONAL ELEMENT" — SULPHUR. — SOLIDS.
		Me_2A: pr. fr. alc.; m.p. 134°, 130.5°. — (By passing HCl gas into MeOH sol. of ac.). — (Pat. Frdl. **III**, 903.)
1285	above 300 sbl. partly without melting	**2,5-o,o-Thiophenedicarbonic Ac., $C_4H_2S(CO_2H)_2$** — ⟨G.O.-D.⟩ — Indistinct cryst. powd. — V.d.s. aq.; s. eth. — $Ba\bar{A}.H_2O$: indistinct cryst.; d.s. c. aq — $Me_2\bar{A}$: pr. fr. alc.; m.p. 145.0–.5°. (Fr. Ag salt & MeI.)
1290	325; 321	**Diphenylenedisulphone, $\ulcorner C_6H_4.SO_2.C_6H_4.SO_2 \urcorner$.** — ⟨*⟩ — Dist. & subl. undecd. — Alm. i. alc., eth.; v.d.s. gl. ac. ac., bz. — Inert. — Ignit. w. soda-lime gives C_6H_6 & some biphenyl.
1295	330	**x-Phenylthiophene, $Ph.C_4H_3S$.** — ⟨*⟩ — Lft. — D.s. c. alc.; v.s. chlf., lgr., bz., CS_2. — W. isatine & conc. H_2SO_4 gives blue color. — Oxidn. w. CrO_3 gives benzoic ac. — (Fr. S + toluene vapor in red-hot tube.)

ANALYTICAL TABLES
OF
ORDER VII
COMPOUNDS CONTAINING SULPHUR AS "ADDITIONAL ELEMENT"

DIVISION B, LIQUID SPECIES.

No.	Boiling-point (C.°)	Specific Gravity	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
1350	5.8 (752) @ 20		**Methyl Mercaptan, MeSH.** — ⟨*⟩ — Odor repulsive & powerful! — Alm. i. aq.; e.s. alc., eth., alk. — Gives violet color w. alk. nitroprusside sol.; dark red-brown in Claesson's react.; green, w. Denigès isatine sulph. ac. — Ⓟ Conduct into H_2SO_4 sol. of isatine. Color changes to olive & grass green (Herter, J. Biol. Ch. **I**, 421 (1906). — Ⓓ Conduct into aq.-$Ag(CN)_2$ sol. Mic. 4-sided pr. of $(MeS)_2Hg$., i. alc., m.p. 175° d., precipitate.
1355	36.2–6.8	.8390 (20/4)	**Ethylmercaptan, EtSH.** — ⟨*⟩ — M.p. = − 144°. — Odor unpleasant, garlicky! — Cooled w. aq. below + 8° forms cryst. hydrate, $EtSH + 18H_2O$. — V.d.s. aq. — Gives dark red-brown color w. $FeCl_3$ in Claesson's react., or a blue color w. alc.-$FeCl_3$. — $(EtS)_2Hg$: colorless lft.; m.p. 76°; s. in 12–15 pt. boiling alc. — $(EtS)_2Pb$: yel. cryst. ppt.; m.p. 150°.
1360	37.1–.5 (755)	854 (20); .845 (21); .8702 (0/4)	**Methyl Sulphide, Me_2S.** — ⟨*⟩ — Odor ethereal-alliaceous (in absence of all impurities, not v. disagreeable)! — I. aq. — Oxidn. w. $KMnO_4$, (Beckmann J. pr. [2] **17**, 453, 1878) gives dimethylsulphone: ndl. fr. alc.; m.p. 109°.
1365	46.2; 46.04c.; 47.5 (764)	1.2634 (20/4)	**Carbon Disulphide, CS_2.** — M.p. − 110°. — Highly refractive liq. — Odor ethereal, & unless specially purified, unpleasant. — 100 pt. aq. @ 12–13° dis. 0.203 pt. — Misc. w. abs. alc., bz., anhydr. eth. — Ignition temp. of vapor only 149°. — Ⓟ (**1**) Dis. 1 drop in 2 cc. of approx. normal sol. of NaOH in alc. Dilute w. 3 cc. c. aq. Acidify w. acetic ac. Add 1 drop 5% $CuSO_4$ sol. A voluminous floc. bright yel. (OY–Y) ppt. quickly forms! — (**2**) Dis. 1 drop in 2 cc. alc. + 1 cc. conc. ammon. (sp. gr. 0.90). Evap. to dryness on steam-bath in small glass capsule. Dis. residue in 1 cc. aq. Acidify w. 1 drop. dil. HCl. Add 1 drop $FeCl_3$ sol. The blood-red color of ferric thiocyanate appears. Ⓓ Add 2 drops of substance to 2 drops pure phenylhydrazine dissolved in 10 drops ether. Cool. Wash the ppt. of colorless lustrous scales w. c. ether, and air dry on fragment of porous tile. The product, phenylhydrazine phenylthiocarbazinate, $Ph.N_2H_2.CS.SN_2H_4.Ph$ (No. **54**.510), melts at 96–7°.
1370	57–60		**Isopropylmercaptan, C_3H_7SH.** — ⟨*⟩.
1375	65–6; 66–9	.837 (20)	**Methyl Ethyl Sulphide, Me.S.Et.** — ⟨*⟩ — Odor ethereal or alliaceous. — Oxidin. w. $KMnO_4$ gives sulphone: s. aq.; ndl.; m.p. 36° (J. pr. ch. [2] **17**, 455).

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENT " — SULPHUR. — LIQUIDS.
1380	65–7		**tert-Butylmercaptan, $Me_3C.SH$.** — ⟨*⟩ — Solid. in frecz. mixt.
1385	67–8		**n-Propylmercaptan, $C_3H_7.SH$.** — ⟨*⟩ — $Hg(C_3H_7S)_2$: lft.; m.p. 68°.
1395	84c.	1.07047 (15/4)	**Thiophene, ⌜CH : CH.S.CH : CH⌝.** — ⟨*⟩ — Odor faint. — (Solidif. by CO_2 + eth. mixt.). — I. aq. — Unchanged by boiling w. Na. — Violently oxid. by HNO_3. — Dissolve small cryst. of isatine in 1 cc. conc. H_2SO_4. Add mere trace HNO_3 or $FeCl_3$. Mix w. a dil. solution of the compound in thiophene-free bz. & shake. An intense blue color quickly appears. (The "indophenene reaction"). Pure H_2SO_4 does not give satisfactory color even on warming. (Bauer, Ber. **37,** 3128)!
1400	84–5	.830 (17)	**sec-Butylmercaptan, C_4H_9SH.** — ⟨*⟩ — $Hg(C_4H_9S)_2$: scales; m.p. 189°.
1405	88	.848 (11.5)	**Isobutylmercaptan, $Me_2CH.CH_2.SH$.** — ⟨*⟩.
1410	90		**Allylmercaptan, C_3H_5SH.** — ⟨*⟩ — $C_3H_5S.HgCl$.: pearly scales fr. h. abs. alc., begins to dec. @ 100°; i. c. aq., alc.
1415	92 (758)	.836 (20/4)	**Ethyl Sulphide, Et_2S.** — ⟨*⟩ — Odor ethereal, alliaceous and disagreeable (unless of v. unusual purity). — I. aq., — Ppts. cryst. $Et_2S.HgCl_2$ (monoclin. pr. fr. eth., m.p. 90°) fr. alc. $HgCl_2$ sol. — Sol. of I in KI gives drops of heavy brown oil ($Et_2S.I_2$) when added even to v. dil. sol. — (Z. f. physiol. ch. **20,** 253 [1895]). — May be oxid. by fuming HNO_3 to diethylsulphone, Et_2SO_2: tbl.; s. aq.; m.p. 70°.
1420	93	1.074 (10)	**Thioacetic Ac., Me.CO.SH.** — ⟨G.O.-D.⟩ — Still liq. @ – 17°. — Odor v. unpleasant, suggestive of H_2S & ac. ac. — S. warm aq.; more s. alc. — Conc. HNO_8 reacts explosively, giving H_2SO_4. — A slightly ammon. aq. sol. of $NH_4\bar{A}$ added to solutions of chlorides of Cu, Pb, As, etc., and heated to boiling, gives ppts. of metallic sulphides like H_2S, the heavy metal salts being very unstable.
1425	93–5		**Methyl Isopropyl Sulphide, $Me.S.CH.Me_2$.** — ⟨*⟩.
1430	97–8	.858 (16)	**n-Butylmercaptan, C_4H_9SH.** — ⟨*⟩ — Odor penetrating and disagreeable. — I. aq.; s. alc., eth. — S. conc. KOH & repptd. by acid. — Oxidn. of Na salt by $KMnO_4$ gives sulphone: cryst.; e.s. alc., eth.; m.p. 43.5°
1435	101	.912	**Vinyl Sulphide, $(CH_2 : CH)_2S$.** — ⟨*⟩ — Odor ethereal. — Little s. aq.; misc. alc., eth. — Destroyed by conc. H_2SO_4 Ignited by conc. HNO_3. — Not at. by alk. — (In allium ursinum L.)
1440	103–4		**Ethyl Isopropyl Sulphide, $Et.S.CHMe_2$.** — ⟨*⟩.
1445	112 (744); 116–18	1.046 (18)	**Methyl Disulphide, Me_2S_2.** — ⟨*⟩ — Odor, unpleasant, alliaceous!
1450	112–3		**2-Methylthiophene, $Me.C_4H_3S$.** — ⟨*⟩ — In alc. sol. w. Na Ac., $HgCl_2$ ppts. $Me.C_6H_2S.HgCl$: ndl. fr. alc.; m.p. 197.° i. aq., eth.
1455	114–5		**(Liq.) Thioisovalerianic Ald., $C_5H_{10}S$.** — Odor unpleasant. — I. aq.; misc. alc., eth.
1460	115–7		**Ethyl Propyl Sulphide, Et.S.Pr.** — ⟨*⟩.
1465	117.4–.6 (745)	.848 (13)	**act.-Amylmercaptan, $Me,Et.CH.CH_2.SH$.** — ⟨*⟩ — $[\alpha]^{13} = +$ 3.49°.
1470	118–9.5; 120.1c.; 116–8c.	.841 (18/0)	**Isoamylmercaptan, $C_5H_{11}SH$.** — ⟨*⟩ — Odor v. unpleasant. — Combines vig. w. HgO to cryst. lft.; i. aq.; d.s. alc., eth.; m.p. 100°. — (Fr. the skunk.)
1475	119–20; 157 sl.d.		**Diacetyl Sulphide, $(Me.CO)_2S$.** — Odor penetrating and v. offensive. — I. aq. — Sl. decd. by c. aq. to acetic & thioacetic acids.

No.	Boiling-point (C.°)	Specific Gravity	"ADDITIONAL ELEMENT" — SULPHUR. — LIQUIDS.
1480	120.5 (763)		**Isopropyl Sulphide, $(Me_2.CH)_2.S$.** — ⟨*⟩ — Oxidn. by $KMnO_4$ (*not* HNO_3) gives corresp. sulphone: cryst.; v.s. aq.; m.p. 36°. (J. pr. Ch. [2] **17,** 460.)
1485	121.5; 126.5	1.046 (16/4)	**Dimethyl Sulphite, Me_2SO_3.** — ⟨*⟩ — Odor acetone-like. — E. saponified by KOH to K_2SO_3 & MeOH!
1490	126 (767)	.857 (20)	**n-Amylmercaptan, $C_5H_{11}SH$.** — ⟨*⟩ — Odor penetrating & unpleasant. — $n_D = 1.44366$.
1495	130		**Thiobutyric Ac., $Me.CH_2.CH_2.COSH$, or, Pr.CS.OH.** — ⟨G.O.-D. — Odor insufferable! — D.s. aq.; more s. alc. — $Pb\bar{A}_2$: volumin. ppt. s. in much boiling aq.
1500	132–4c.	.990 (24)	**2-Ethylthiophene, $C_4H_3S.Et$.** — ⟨*⟩.
1505	130–40d.	1.24	**Diethyldisulphoxide, Et.SO.SO.Et.** — ⟨*⟩ — Odor v. unpleasant, garlicky. — Vol. w. st. — E.s. alc., eth.; i. lgr. — Red. by Zn + dil. HCl to Et_2S & EtSH.
1510	135–6	1.001 (16)	**3-Ethylthiophene, $C_4H_3S.Et$.** — ⟨*⟩ — Misc. alc., eth., chlf., lgr., bz. — Oxid. by $KMnO_4$ to β-thiophenecarbonic ac.
1515	136–7c.	.994 (21)	**2,3-Dimethylthiophene, v-Thioxene, $Me_2.C_4H_2S$.** — ⟨*⟩. — Oxid. by $KMnO_4$ to o-thiophenedicarbonic ac.
1520	136.5–7.5 c.; 135.5–6c.	.976 (17.5)	**2,5-Dimethylthiophene, o-Thioxene, $Me_2.C_4H_2S$.** — ⟨*⟩ — Oxidn. by $KMnO_4$ to 2,5-thiophenedicarbonic ac. — W. isatine + oil of vit. gives strong red-violet color!
1525	137–8c.	.996 (20)	**2,4-Dimethylthiophene, m-Thioxene, $Me_2.C_4H_2S$.** — ⟨*⟩ — Oxidn. w. alk. $KMnO_4$ gives m-thiophenedicarbonic ac., etc.
1530	138.6c. (758)	.8876 (27/4)	**Allyl Sulphide, $(CH_2 : CH.CH_2)_2.S$.** — ⟨*⟩ — Odor, strong garlicky! — Little s. aq. — $2AgNO_3.C_6H_{10}S$: ppts. on mixing w. alc. $AgNO_3$ sol.; e.s. aq.; d.s. c. alc.; cryst. fr. h. alc. in ndl.; NH_3 separates allyl sulphide.
1535	141.5–2.5 (772)	.814 (17)	**n-Propyl Sulphide, $(C_3H_7)_2S$.** — ⟨*⟩ — Odor alliaceous. — Corresp. sulphone (by $KMnO_4$ oxidn): m.p. 29–30°.
1540	142c.	.886 (0)	**sec-Hexylmercaptan, $C_6H_{13}SH$.** — ⟨*⟩ — $Hg(C_6H_{13}S)_2$: liq.; sp. gr. 1.6502 (0).
1545	144–6	1.0078 (23/21.6)	**3,4-Dimethylthiophene, m-Thioxene, $Me_2.C_4H_2S$.** — ⟨*⟩.
1550	146	1.123 (23.5)	**Ethylenedimercaptan, Ethanedithiol-(1,2), $HS.CH_2.CH_2.SH$.** — ⟨*⟩ — E.s. in alc. or alk.
1555	145–8		**Hexylmercaptan, (fr. petroleum hexylchloride), $C_6H_{13}.SH$.** — ⟨*⟩.
1560	149–50 (768)c.	.849 (20)	**Hexylmercaptan, $Me.(CH_2)_4.CH_2SH$.** — ⟨*⟩ — Odor penetrating. — I. aq.
1565	152		**Propylenedimercaptan, $Me.CH(SH).CH_2SH$.** — ⟨*⟩.
1570	152.8–3.4c. (730)	.9927 (20/4)	**Ethyl Disulphide, Et_2S_2.** — ⟨*⟩ — Odor garlicky. — Alm. i. aq.
1575	153–4c.	.9695 (16)	**Isopropylthiophene, $Me_2CH.C_4H_3S$.** — ⟨*⟩ — Added w. little conc. H_2SO_4 to gl. ac. ac. sol. of phenanthrenequinone gives intense violet-red color!
1580	156	1.028 (18)	**Ethyl Ethylthiolcarbonate, $Et.CO_2.SEt$.** — ⟨*⟩ — Odor peculiar. — W. aq. @ 160° dec. to alc., CO_2, EtSH & Et_2S.
1585	157.5–9.5c.	.974 (16)	**α-n-Propylthiophene, $C_3H_7.C_4H_3S$.** — ⟨*⟩ — Oxidn. yields α-thiophenecarbonic ac: m.p. 126.5°.
1590	158	1.105 (0/0)	**Diethyl Sulphite, Et_2SO_3.** — ⟨*⟩.
1595	161–2	1.032 (1)	**Diethyl Thioncarbonate, $CS.(OEt)_2$.** — ⟨*⟩ — Odor agreeable, ethereal. — I. aq.; v.s. alc., eth. — Alc. ammon. gives NH_4CNS & alc. in the cold. — (No corresp. free ac.)
1600	164–5	.835 (20)	**Heptanethiol-(2), $Me.(CH_2)_4.CH(SH).Me$.** — ⟨*⟩ — I. aq. — $n_D = 1.44596$.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENT " — SULPHUR. — LIQUIDS.
1605	165	.832 (23)	**sec-Butyl Sulphide, $(MeEtCH)_2.S$.** — ⟨*⟩.
1610	166		**Thienylmercaptan, $C_4H_3S.SH$.** — ⟨*⟩ — Yel. oil. — Odor v. offensive. — Vol. w. st. — Sol. in conc. ammonia slowly oxid. by air to disulphide: yel. ndl.; m.p. 55–6°. — $Ag\bar{A}$: yel. ppt.
1615	169		**Dimethyl Dithiolcarbonate, $CO(SMe)_2$.** — ⟨*⟩ — Odor garlicky. — I. aq. — Alc.-KOH gives MeSH & CO_2. — $Ag\bar{A}$: yel. ppt.
1620	169.5; (760) 172.5	1.078 (24)	**Thiophenol, Phenylmercaptan, $C_6H_5.SH$.** — ⟨*⟩ — Odor unpleasant, alliaceous. — I. aq.; c.s. alc., eth., bz., CS_2. — Burns skin. — Sol. in conc. H_2SO_4 becomes cherry red and then blue on warming! (H. **5**,321). — $Ag\bar{A}_2$: silky ndl. fr. h. alc. — Ppts. yel. cryst. — $Pb\bar{A}_2$: fr. alc. sol. of $Pb\bar{A}c_2$. — (Heated w. KOH gives phenol).
1625	169; 169–70		**Trimethylene Dimercaptan, $HS.CH_2.CH_2.CH_2.SH$.** — ⟨*⟩ — Oil of unpleasant odor. — E. vol. w. st. — D.s. aq.; misc. alc., eth., chlf., bz. — Oxidn. w. $KMnO_4$ & H_2SO_4 gives a sulphone: ndl. fr. h. aq.; m.p. 155°.
1630	170 sl.d.	1.199 (17/0)	**Methyl Trisulphide, Me_2S_3.** — Oil of v. disagreeable odor.
1635	172–3 (747); 170.5 (752)	.836 (10)	**Isobutyl Sulphide, $(C_4H_9)_2S$.** — ⟨*⟩ — Oxid. by $KMnO_4$ to corresp. sulphone: b.p. 265°; m.p. + 17°.
1640	174.5		**Isopropyl Disulphide, $(Me_2CH)_2S_2$.** — ⟨*⟩ — Odor unpleasant.
1645	174–5		**n-Heptylmercaptan, $C_7H_{15}.SH$.** — ⟨*⟩.
1650	180d.		**Diethyl Dicarbothionate, $S(CO_2Et)_2$.** — ⟨*⟩ — Odor peculiar. — Alc.-KOH gives Et_2S & K_2CO_3.
1655	181c.	.962 (14)	**Diethylthiophene, $Et_2.C_4H_2S$.** — ⟨*⟩.
1660	181–2c.	.957 (19)	**α-Butylthiophene, $C_4H_9.C_4H_3S$.** — ⟨*⟩.
1665	182–4	·944 (21)	**Tetramethylthiophene, $Me_4.C_4S$.** — ⟨*⟩ — Does *not* give "indophenine react." (Ber. **21**, 1838).
1670	182	.852 (0)	**n-Butyl Sulphide, Bu_2S.** — ⟨*⟩ — (Odor Ann. **171**, 253). — Oxidn. by fuming HNO_3 gives corresp. sulphone: cryst. plates; m.p. 43.5° (Ann. **175**, 348).
1675	83–5c.d.		**Dithioacetone, Duplothioacetone, $(C_3H_6S)_2$.** — I. yel. oil. — Oxid. by c. 5% $KMnO_4$ to a disulphone: ndl. fr. alc.; m.p. 220–5° d. — (Ber. **20**, 375.)
1680	184	.987 (20)	**Methanediol Diethylether, $CH_2(SEt)_2$.** — Bad smelling liq. — Oxidn. by 5% $KMnO_4$ in acid sol. gives sulphone: lft. fr. aq.; m.p. 104°.
1685	184	1.129 (18)	**Methyl Ethylxanthate, EtO.CS.SMe.** — Alc.-KOH gives methylmercaptan, No. **7**.1350.
1690	185–7		**Dithioacetale, $Me.CH(SEt)_2$.** — Odor disagreeable. — I. aq. — V. stable to ac. & alk. — (Fr. aldehyde, H_2S & HCl.)
1695	85–7 sl.d.		**Acetaldehyde-diethylmercaptal, Dithioacetal, $Me.CH(SEt)_2$.** — Odor unpleasant. — V. stable to ac. or alk. — Acidified $KMnO_4$ gives corresp. sulphone: cryst. fr. aq.; m.p. 75°; b.p. abt. 320°.
1700	186–7	.903 (0)	**Dicrotyl Sulphide, $(Me.CH : CH.CH_2)_2S$.** — Odor disagreeable. — Taste burning.
1705	187–8		**Methyl Phenyl Sulphide, $Me.S.C_6H_5$.** — ⟨*⟩ — (Ber. **20**, 2926).
1710	188c.	1.333 (15/15)	**Dimethyl Sulphate, Et_2SO_3.** — ⟨*⟩ — M.p. − 2.68°. — Vapors toxic.
1715	192.5		**Proply Disulphide, $(C_3H_7)_2S_2$.** — ⟨*⟩ — Odor disagreeable.
1720	194		**Dipropyl Sulphite, $(C_3H_7)_2SO_3$.** — ⟨*⟩.
1725	193; 194.3; 188		**Thio-2-cresol, 1-Methylthiophenol-(2), $Me.C_6H_4.SH$.** — ⟨*⟩ — Lft. — M.p. + 15°. — $Pb\bar{A}$: brick red ppt.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENT " — SULPHUR. — LIQUIDS.
1730	195.4 (760); 195–205	1.0625 (0/4)	**Thio-3-cresol, $Me.C_6H_4.SH$.** — ⟨*⟩ — Still liq. @ −20°.
1735	194–5	1.058 (20)	**Benzylmercaptan, $C_7H_7.SH$.** — ⟨*⟩ — Odor unpleasant, alliaceous! — Oxid. in air to the disulphide. — Oxid. by HNO_3 to benzoic & sulphuric ac. — $Ag\bar{A}_2$: ndl. fr. abs. alc.; d.s. h. abs. alc.
1740	195–8		**Benzyl Methyl Sulphide, $C_7H_7.S.Me$.** — ⟨*⟩ — (Ber. **20**, 2926).
1745	196–7	1.084 (23)	**Diethyl Dithiolcarbonate, $CO.(SEt)_2$.** — ⟨*⟩ — Odor garlicky — Alc.-KOH splits to CO_2 & EtSH.
1750	197.5–200.5		**Methyl Ethanesulphonate, $EtSO_3.Me$.** — ⟨*⟩ — Corresp. ac. is stable & deliq. (No m.p. recorded).
1755	abt. 198–200	1.024 (15)	**Allyl Disulphide, $(CH_2:CH.CH_2)_2S_2$.** — ⟨*⟩ — Strong garlic odor! — (Forms 60% oil of garlic, allium sativum, b.p. 79–81°, 16 mm.).
1760	198c.	1.215 (21)	**α-Thiophenic Ald., $C_4H_3S.CHO$.** — Odor like benzaldehyde! Gives color w. fuchsine aldehyde reagt. like benzaldehyde. — Oxid. by air to α-thiophenecarbonic ac., No. **7**.835 — Oxime: m.p. 133°.
1765	200	1.085 (19)	**Ethyl Ethylxyanthate, EtS.CS.OEt.** — ⟨*⟩ — Odor like garlic! — Heated w. alc.-KOH gives ethylmercaptan & EtO.CO.SK.
1770	204 (743)	1.032 (10)	**Ethyl Phenyl Sulphide, $Et.S.C_6H_5$.** — ⟨*⟩ — Odor disagreeable. — Oxid. by 1 pt. $KMnO_4$ & 30 pt. aq. @ 100° gives the sulphone, $Et.SO_2.C_6H_5$: tbl. fr. eth.; m.p. 42°.
1775	204–5	1.159 (18)	**Dimethyl Trithiocarbonate, $CS(SMe)_2$.** — ⟨*⟩ — Odor powerful & disagreeable. — I. aq.; misc. alc., eth. — Alc.-NH_3 @ 100° dec. to NH_4SCN & MeSH.
1780	200–10	lighter than aq.	**Bis-ethylthio-2-methylpropane, Isobutyricaldehydediethylmercaptal, $Me_2CH.CH(SEt)_2$.** — ⟨*⟩ — Bad smelling oil. — Oxidn. w. sulph. ac. & $KMnO_4$ gives sulphone: m.p. 94°; ndl. fr. alc.; s. h. aq.
1785	205–6		**1,4-Dimethylthiophenol-(2), $Me_2.C_6H_3SH$.** — ⟨*⟩.
1790	207c.		**β-Thienyl Alc., $C_4H_3S.CH_2OH$.** — Odor like benzyl alc.
1795	207–8		**1,3-Dimethylthiophenol-(4), $Me_2.C_6H_3.SH$.** — ⟨*⟩.
1800	208 sl.d.	1.199 (0/4); 1.172 (25/4)	**Diethyl Sulphate, Et_2SO_4.** — ⟨*⟩ — Odor peppermint-like; v. toxic. — I. aq. — Prolonged boiling w. aq. gives alc. (T. **1**.814) & H_2SO_4.
1805	210–2	.972 (15)	**Disulphide, $C_7H_{14}S_2$.** — (Forming 45% of crude oil of asafetida). — Pale yellowish oil. — $[\alpha]_D = -12° 30'$ in 1 dc. tube. — Alc. sol. gives ppt. of $C_7H_{14}S_2.2HgCl_2$: colorless ndl. — (Archiv. d. Pharm.)
1810	210–13	.987 (15.5)	**Ethanedithioldiethylether, $EtS.CH_2CH_2.SEt$.** — ⟨*⟩ — Oxidn. w. HNO_3 (1.2 sp. gr.) at ord. temp. gives the sulphide: cryst. scales; m.p. 170°. — W. $KMnO_4$, gives the sulphone: ndl. fr. alc.; m.p. 136.5°.
1815	213.5c.	1.167 (24)	**2-Acetothienone, $Me.CO.C_4H_3S$.** — ⟨*⟩ — St. liq. @ − 15°. — Odor like acetophenone. — Gives blue color w. isatine & conc. H_2SO_4! — Oxidn. by $KMnO_4$ yields α-thiophenecarbonic ac., (m.p. 126.5°; No. **7**.835).
1820	213.4c.	1.171 (0)	**Ethyl Ethanesulphonate, $EtSO_3.Et$.** — ⟨*⟩ — (Corresp. ac. deliq., stable, no m. p.).
1825	214–5c.; 216; 209–11	.843 (20/4)	**Isoamyl Sulphide, $(C_5H_{11})_2S$.** — ⟨*⟩ — **Odor ethereal. — Oxidn. by $KMnO_4$ (*not* HNO_3) gives corresp. sulphone: ndl.; d.s. aq.; m.p. 31°; b.p. 295°. (Ber. 17, 539).**
1830	214–6; 218–24		**Benzyl Ethyl Sulphide, $C_7H_7.S.Et$.** — ⟨*⟩ — **Odor very penetrating!**
1835	216–7c. (751)	1.237 (0)	**Thiopyrocatechol, Phenolthiol-(1,2), $HO.C_6H_4.SH$.** — ⟨*⟩ — **Highly refract. liq. of powerful odor. — Solid. by freezing**

No.	Boiling-point (C.°)	Specific Gravity	“ADDITIONAL ELEMENT” — SULPHUR. — LIQUIDS.
			mixt. to cryst. mass, m.p. + 5–6°. — D.s. aq.; s. eth. — Reacts ac., decg. carbonates. — Action on skin caustic. — Pb salt: yel. ppt. — Aq. sol. w. $FeCl_3$ becomes turbid w. transient violet color, changed to red by NaOH. — Oxidn. by air in alk. sol. to corresp. disulphide (an oil).
1840	218c.	1.115 (29)	**Ethyl α-Thiophenecarbonate, $C_5H_3SO_2Et$.** — ⟨*⟩ — Odor like ethyl benzoate. — M.p. of corresp. ac., 126.5°.
1845	220		**Isobutyl Disulphide, $(C_4H_9)_2S_2$.**
1850	224–6c.		**Thiophten, $C_6H_4S_2$.** — Liq. @ – 10°. — Odor faint, unpleasant. — Gives “ indophenine react.” (Cf. No. **7**.1395) w. isatine & H_2SO_4 on warming. — B̄.Pk: yel. ndl.; e.s. alc., eth.; m.p. 133°.
	225–30d.		**Trithioacetone.** — Cf. No. **7**.65.
1860	228–9	1.019	**1,3,5-Trimethylthiophenol-(2), Thiomesital, $Me_3.C_6H_2.SH$.** — ⟨*⟩ — $Ag\bar{A}$: light yel. ppt. — $Hg\bar{A}_2$: ndl.
1865	228–30		**Thiophenol Acetate, $CH_3.COS.C_6H_5$.** — ⟨*⟩ — Odor, unpleasant. — I. aq.; e.s. alc., eth. — Solutions gradually separate phenyldisulphide, **7**.285, in air. — Boiled w. conc. KOH gives thiophenol & ac. ac.
1870	230		**Hexyl Sulphide, (fr. petroleum), $(C_6H_{13})_2S$.** — ⟨*⟩.
1875	235–6	.998 (17.5)	**Thiocarvacrol, 1-Methyl-4-isopropylthiophenol, $Me.C_6H_3$.-$(C_3H_7)(SH)$.** — ⟨*⟩ — $Ag\bar{A}_2$: ndl. fr. alc.; m.p. 109°. — (Fr. camphor & P_2S_5.)
1885	240d.	1.012 (15)	**Diethyl Trithiocarbonate, $CS(SEt)_2$.** — ⟨*⟩ — Oil of unpleasant odor. — Misc. alc., eth. — Slow hearing dec. partly to CS_2 & Et_2S. — Alc.-$HgCl_2$ sol. gives ppt. of C̄.6$HgCl_2$. — Alc.-KOH dec. to mercaptan & thiosalt.
1890	245–8 sl.d. 250	.918 (19)	**Isoamyl Disulphide, $(C_5H_{11})_2S_2$.**
1895	265		**Phenylthienylmethane, $Ph.CH_2.C_4H_3S$.** — ⟨*⟩ — Odor like fruit-ether. — Gives red color w. isatine & conc. H_2SO_4.
1900	265	1.006 (18)	**Isobutylsulphone, $(C_4H_9)_2SO_2$.** — ⟨*⟩ — M.p. + 17°. — V. stable.
1905	267		**Dithienylmethane, $(C_4H_3S)_2CH_2$.** — ⟨*⟩ — Odor orange-like! — A trace w. conc. H_2SO_4 & isatine gives red color!
1910	270–80		**1,1^1-Dithienylethane, $(C_4H_3S)_2CH.Me$.** — ⟨*⟩ — Yellowish oil. — E.s. eth., bz., h. alc. — Odor faintly like diphenylmethane.
1915	abt. 280c.d.	.992 (23)	**Diacetalyl Sulphide, $[(EtO)_2CH.CH_2]_2S$.** — Odor faint. — $n_D^{23.5}$ = 1.44734. — S. aq.; e.s. org. solv. — W. 1% HCl gives colorless sol. wh. gives mirror in ammon. aq. sol. — C̄ + $HgCl_2$: ndl. fr. alc.; i. aq.; e.s. alc.; m.p. 70°.
1920	285		**o-Tolyl Sulphide, $(C_7H_7)_2S$.** — ⟨*⟩ — D.s. alc.; v.s. eth., chlf., CS_2. — Tbl. fr. alc.; m.p. 64°.
1925	285d.	1.146 (23)	**α-Thionaphthol, $C_{10}H_7SH$.** — ⟨*⟩ — E.s. alc., eth.; d.s. aq.-alk. — Dec. on distn. to H_2S & α-naphthylsulphide. — $Ag\bar{A}_2$: pale yel. powd. — $Pb\bar{A}_2$: yellow ppt.; distn. gives α-naphthylsulphide.
1930	296.5 (th.i.)	1.1185 (15/15)	**Phenyl Sulphide, $(C_6H_5)_2S$.** — ⟨*⟩ — Odor alliaceous. — I. aq.; e.s. h. alc.; misc. eth., bz., CS_2. — Alc. sol. *not* pptd. by $AgNO_3$. — Oxidn. by conc. HNO_3, or CrO_3 mixt. to diphenylsulphone; m.p. 128–9°; No. **7**.850.
1935	298		**Di-n-heptyl Sulphide, $(C_7H_{15})_2.S$.** — ⟨*⟩.
1940	306	1.1131 (0/4)	**Phenylo-Tolyl Sulphide, $C_6H_5.S.C_7H_7$.** — ⟨*⟩.
1945	309.5	1.1058 (0/4)	**Phenylm-Tolyl Sulphide, $C_6H_5.S.C_7H_7$.** — ⟨*⟩ — M.p. = – 6.5°; solid @ – 18°.

CHAPTER VII

ORDER L

COMPOUNDS CONTAINING NITROGEN AND CHLORINE AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

(**A**) **Color** (T. **4**.1). — The tabulated species of Order L contain a higher proportion of colored compounds than any of the earlier orders of this volume. The most frequently occurring color is yellow. Among the types in this order in which color is most often observed are the chlorine substitution products of the nitrohydrocarbons, nitrophenols, nitroarylamines, azo and azoxy derivatives, and quinonediimide dichlorides. The hydrochlorides of the aromatic aminoazo compounds are also very deeply colored.

(**B**) **Divisions.** — *Division A* contains all species solid at room-temperature. *Division B* contains all species liquid at room-temperature. Neither division is subdivided into sections.

(**C**) **Odor.** — Many of the species belonging to Division B are distinguished by extremely irritating odors.

(**D**) [*The sign* (*) *in the tables of Order L directs attention to this paragraph.*] — In every case study the behavior of the compound towards hot alkali (T. **4**.4-a) and silver nitrate (T. **4**.5) solutions; and ascertain (T. **4**.15) whether it may be the hydrochloric acid salt of an organic base or the ammonium salt of a chlorinated organic acid.

Aromatic compounds in which chlorine replaces hydrogen on a benzene nucleus in positions ortho or para to nitro groups are likely to give the test for "reactive" halogen in Test **4**.4-a. But the same test may be expected generally to indicate an "unreactive" condition of the halogen when the substituents are in the meta position to one another. An increase in the number of ortho and para nitro groups increases the reactivity of the halogen. Thus, while the precipitate of silver chloride secured as the result of application of the test to ortho- or para-chlornitrobenzene is little more than a pronounced turbidity, 1-chlor-2,4,6-trinitrobenzene gives a very heavy precipitate.

Never draw the conclusion, because a substance yields vapors of ammoniacal odor in Test **4**.4-a, that it *must* be an ammonium salt. The confirmatory evidence called for in Test **4**.15 should always be sought.

(**E**) Determine the "Neutralization Equivalent," "N. Eq.", of every colorless solid species which has a strongly acid reaction and does not exhibit the characteristics of an ammonium or substituted ammonium salt (T. **4**.15), or acid chloride (T. **4**.11). Directions for the use of derivatives of carboxylic acids in confirmatory testing are given under T. **4**.10.

(G) Miscellaneous Types. — [*The sign* (**) *in the tables of Order L directs attention to the following paragraphs.*] —

Chlorides of Organic Bases. — See T. 4.6, and note under G.O.-D.

Chlorinated Anilines. — o-Chloraniline ($K_B \times 10^{13} = 9$) and the polychloranilines show the behavior of "neutral" species in the special titration with Congo paper indicator prescribed on page 9, Volume II, as a generic test in Order II; while parachloraniline and metachloraniline consume only about 1 c.c. of $\frac{N}{10}$ hydrochloric acid, and are therefore only very slightly basic.

Chlornitrophenols. — These compounds dissolve in dilute sodium hydroxide, often giving colored solutions, but are nearly insoluble in cold water.

Nitro Derivatives of Aromatic Acid Chlorides. — See T. 4.11-a.

Use of Chloroplatinates in Confirmatory Tests. — For references see T. 4.6.

ANALYTICAL TABLES

OF

ORDER L

COMPOUNDS CONTAINING NITROGEN AND CHLORINE AS "ADDITIONAL ELEMENTS"

DIVISION A, SOLID SPECIES.

No.	Melting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
49	21	**2,3,4,5-Tetrachlorpyridine, C_5HNCl_4.** — ⟨*⟩ — Ndl. fr. alc. — Volat. w. st. B.p. 135–7° (24 mm.). — $HgCl_2$ gives cryst. deriv. — (H. aq.-NaOH sol. removes 1 atom Cl).
50	21–2	**4-Chlor-o-toluidine, $Cl.C_6H_3.Me, NH_2$.** — ⟨**⟩ — B.p. 237° (722).
55	21–2	**1,2,3,5-Tetrachlornitrobenzene, $Cl_4.C_6H.NO_2$.** — ⟨*⟩ — Ndl. — E.s. CS_2, bz., h. alc.
60	23–4	**2,3-Dichloraniline, $Cl_2.C_6H_3.NH_2$.** — ⟨**⟩ — B.p. 252°. — E.s. alc.; d.s. lgr.
65	26	**2-Chlor-p-toluidine, $Cl.C_6H_3Me.NH_2(Me = 1)$.** — ⟨**⟩ — B.p. 237–8.5°, 245°.
70	28.5	**2,4,6**(?)**-Trichlormethylaniline, $Cl_3.C_6H_2.NHMe$.** — ⟨**⟩ — B.p. 260°. — Hydrochloride decd. by aq., but stable towards alc.
75	29–30	**5-Chlor-o-toluidine, $Cl.C_6H_3.Me,NH_2$.** — ⟨**⟩ — B.p. 236–8° (730). — Cryst.
80	29–30	**4-Chlor-m-toluidine, $Cl.C_6H_3Me.NH_2$.** — ⟨**⟩ — B.p. 230°. — V. vol. — Thin lft. fr. aq. — $\bar{B}$.HCl: ndl.; partly decd. by aq.
85	31–2	**5-(Bz-4)-Chlorquinoline, $Cl.C_9H_6N$.** — B.p. 267–8°. — $\bar{B}_2.H_2PtCl_6$: or.-yel. ndl.; d. 253°.
90	32	**1^1-Chlor-2,4-dinitrotoluene, $CH_2Cl.C_6H_3(NO_2)_2$.** — ⟨*⟩ — *Yel.* pr. fr. eth. — W. alc.-KOH gives tetranitrostilbene. — Sn + HCl gives 2,4-toluylenediamine, No. **2**.744.
95	32.5	**o-Chlornitrobenzene, $Cl.C_6H_4.NO_2$.** — ⟨*⟩ — B.p. 243°. — Sp. gr. = 1.368 (22°). — W. NaOH sol. @ 130° gives o-nitrophenol.
100	33	**2,4-Dichlor-nitrobenzene, $Cl_2.C_6H_3.NO_2$** — ⟨*⟩ — Ndl. fr. alc. — Alc.-NaOH acts cold to give a nitrochlorphenyl-ethyl eth.
105	34	**Py-4-Chlorquinoline, $Cl.C_9H_6N$.** — B.p. 260–1° (744 mm.). — V.s. alc., eth.; e.s. dil. HCl. — Vol. w. alc. — $\bar{B}_2.H_2PtCl_6.2H_2O$: ppt., or light yel. ndl. fr. dil. HCl.; e.s. h. aq. w. decn.; m.p. 278–9°,d.
110	35	**m-Nitrobenzoyl Chloride, $NO_2.C_6H_4.COCl$.** — ⟨T. **4**.11-a⟩ — B.p. 154–5° (18 mm.). — Amide: ndl.; m.p. 140–2°.
115	35.5	**4-Chlor-dimethylaniline, $Cl.C_6H_4.NMe_2$.** — B.p. 230–1°. — Flat lust. ndl. fr. alc. — $\bar{B}_2.H_2PtCl_6$: golden pr.
120	37	**2-Chlor-6-nitrotoluene, $Cl(NO_2).C_6H_3Me$.** — ⟨*⟩ — B.p. 236–8°. — Ndl. fr. dil. alc.
125	37–8	**Py-2-Chlorquinoline, $\ulcorner N : CCl.CH : CH.C_6H_4 \urcorner$.** — B.p. 266–7°, 275°. — Ndl. fr. dil. alc. — Odor charac. — Alm. i. aq.; v.s. alc., eth., bz., lgr. — Sn + HCl gives tetrahydroquinoline, No. **2**.1385.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND CHLORINE. — SOLIDS.
130	38	**4-Chlor-2-nitrotoluene, $Cl(NO_2).C_6H_3Me$.** — ⟨*⟩ — B.p. 240° (718 mm.). — Ndl. — D.s. c. alc. — E. vol. w. st. — Not at. by CrO_3 mixt.
135	38.9	**5-Chlor-2-nitrophenol, $Cl(NO_2).C_6H_3.OH$.** — ⟨G.O.-G.⟩ — *Lemon yel.* pr. fr. aq. — Fused & then solidifid. by c. aq. remelts @ 32.7°, m.p. rising to 38.9° again after few days. — $Na\bar{A}$: flat scarlet-red pr.; r.d.s. c. aq. — $Me\bar{A}$: yel.-green ndl.; m.p. 70.5°.
140	39	**2,6-Dichloraniline, $Cl_2.C_6H_4.NH_2$.** — ⟨**⟩ — Ndl.
145	39–40	**Chloraloxime, $CCl_3.CH : NOH$.** — I. aq.; e.s. alc., eth. — Dil. NaOH dec. to HCl, HCN & CO_2!
150	40–1	**6-(Bz-3)-Chlorquinoline, C_9H_6ClN.** — B.p. 261–2° (740 mm.). — Glassy ndl.
155	42	**2-Chlor-1,3-dinitrobenzene, $Cl.C_6H_3.(NO_2)_2$.** — ⟨*⟩ — B.p. 315°. — Sp. gr. 1.6867 @ 16.5°. — Alm. i. c. alc.; s. eth., C_6H_6, CS_2.
160	43	**3,4-Dichlornitrobenzene, $Cl_2.C_6H_3.NO_2$.** — ⟨*⟩ — Ndl. fr. alc. — W. alc.-NH_3 @ 210° gives chlornitraniline, M.p. 104–5°. — (Fr. nitration of o-dichlorbenzene.)
165	44	**2-Chlor-5-nitrotoluene, $Cl(NO_2).C_6H_3.Me$.** — ⟨*⟩ — B.p. 248° (711). — *Yellowish* pyr. — E.s. eth.
170	44.4	**m-Chlornitrobenzene, $Cl.C_6H_4.NO_2$.** — ⟨*⟩ — B.p. 235.6° c. — Sp. gr. = 1.534. — E.s. eth., bz., h. alc.; less s. c. alc.
175	45	**7-(Bz-2)-Chlorquinoline, C_9H_6ClN.** — B.p. 256°. — Cryst. fr. alc. — $\bar{B}_2.H_2PtCl_6$: yel. ndl.; m.p. 255°.
180	45; 45–6	**2-Chlor-3,5-dinitrotoluene, $Cl(NO_2)_2.C_6H_2Me$.** — ⟨*⟩ — *Yel.* ndl. — E.s. alc., eth.
185	46	**$1^1,1^1$-Dichlor-4-nitrotoluene, $CHCl_2.C_6H_4.NO_2$.** — ⟨T. **4**.3-a⟩ — Pr. fr. alc. — E.s. alc., eth.
190	45–7	**m-Nitrobenzyl Chloride, $NO_2.C_6H_4.CH_2Cl$.** — ⟨T. **4**.11-a⟩ — B.p. 173–83° (30–35 mm.). — Vol. w. st. — Ndl. fr. lgr.
195	47	**o-Chlorphenylhydrazine, $Cl.C_6H_4.NH.NH_2$.** — Does not dist. — $\bar{B}$.HCl: ndl.; m.p. 190°d.
200	48	**4-Chlor-3,5-dinitrotoluene, $Cl(NO_2)_2.C_6H_2Me$.** — ⟨*⟩ — Ndl. fr. alc. — Reductn. gives diamine, m.p. 111°.
205	48–9	**o-Nitrobenzyl Chloride, $NO_2.C_6H_4.CH_2Cl$.** — ⟨T. **4**.3-a⟩ — Calcite-like cryst. fr. lgr.
210	48–9	**1^1-Chlor-1^2-nitrostyrene, $C_6H_5.CCl : CH(NO_2)$.** — Lust. *yel.* cryst. — E.s. alc.
215	49–50	**Trichlorpyridine, $Cl_3.C_5H_2N$.** — B.p. 100–120° (16 mm.) — Flat ndl. fr. alc. — I. aq.; e.s. h. alc.; d.s. pet.-eth. — Alc.-$HgCl_2$ sol. ppts. $HgCl_2$ comp.: m.p. abt. 209°d.
220	50	**2,5-Dichloraniline, $Cl_2.C_6H_3.NH_2$.** — ⟨**⟩ — B.p. 251°. — Ndl. fr. lgr.
225	50.5	**3,5-Dichloraniline, $Cl_2.C_6H_3.NH_2$.** — ⟨**⟩ — B.p. 259–60°. — Ndl.
230	50	**4-Chlor-1,3-dinitrobenzene, $Cl.C_6H_4.(NO_2)_2$.** — ⟨*⟩ — B.p. 315° sl. d. — Boiled w. alc.-ammon. gives 2,4-dinitroaniline, No. **2**.3539–1.
232	52	**5-Chlor-2-aminophenol-methylether, Chlor-o-anisidine, $Cl.C_6H_3.(OMe)(NH_2)$.** — B.p. 260°. — Cryst. fr. alc. — E.s. alc., eth., bz. — $\bar{B}$Pk (T. **2**.23): green-yel. ndl.; m.p. 200°d. — Acetyl deriv: lft. fr. aq.; m.p. 150°.
235	53	**1,3,5-Chlordinitrobenzene, $Cl.C_6H_3(NO_2)_2$.** — ⟨*⟩ — Ndl. fr. alc. — Vol. w. st. — E.s. alc., eth.
240	54.5	**2,5-Dichlornitrobenzene, $Cl_2.C_6H_3.NO_2$.** — ⟨*⟩ — B.p. 266°. — Sp. gr. 1.669 (22°). — Triclin. cryst. — D.s. c. alc.; e.s. bz. or h. alc. — Alc.-KOH gives 4-chlor-2-nitrophenol, No. **50**.560.
245	55–6	**2,3,4-Trichlornitrobenzene, $Cl_3.C_6H_2.NO_2$.** — ⟨*⟩ — Silky ndl. — D.s. alc.; e.s. CS_2. — W. alc.-ammon. @ 210° gives 5,6-dichlor-2-nitroaniline, No. **50**.1295.
255	56	**$2,2^1$-Dichlorazoxybenzene, $(Cl.C_6H_4)_2N_2O$.** — *Pale yel.* ndl. fr. alc.
260	56	**2-Chlor-α-naphthylamine, $Cl.C_{10}H_6.NH_2$.** — Thin ndl. — Vol. w. st. — Odor

No.	Melting-point (C.°)	“ ADDITIONAL ELEMENTS ” — NITROGEN AND CHLORINE. — SOLIDS.
		fecal! — D.s. h. aq.; e.s. alc. — $\bar{B}.HCl.H_2O$: silky ndl.; completely hydrolyzed by aq.
265	57	**2,4,5-Trichlornitrobenzene, $Cl_3.C_6H_2(NO_2)$.** — ⟨*⟩ — B.p. 288°. — Pr. fr. CS_2. — D.s. c. alc. — (Heated w. ammon. gives 3,4-dichlor-6-nitraniline.)
270	58–9	**1^2-Chlor-2-nitrostyrene, $NO_2.C_6H_4.CH : CHCl$.** — ⟨*⟩ — Lust. *yellowish* cryst. fr. alc. — V.s. eth., h. alc.
275	59	**5-Chlor-1,3-dinitrobenzene, $Cl.C_6H_3(NO_2)_2$.** — ⟨*⟩.
280	59	**1-Chlor-2-naphthylamine, $Cl.C_{10}H_6.NH_2$.** — Ndl. fr. dil. alc. — Oxidn. by HNO_3 gives phthalic ac. — $\bar{B}.HCl.H_2O$: ndl.; d.s. c. aq.
285	60	**2,3,4-Trichlornitrotoluene, $Cl_3.C_6H.Me,NO_2$.** — ⟨*⟩ — *Yellowish* ndl. fr. alc.
290	60	**2-Chlor-1,4-dinitrobenzene, $Cl.C_6H_3(NO_2)_2$.** — ⟨*⟩ — *Yel.* e.s. cryst. fr. lgr. — I. aq.
295	60	**3,5-Dichlor-p-toluidine, $Cl_2.C_6H_2Me.NH_2$.** — ⟨**⟩ — Ndl. — V.s. alc., eth. — Little vol. w. st.
300	60	**Hexachlor-2-methylpyridine, $C_5HCl_3N.CCl_3$.** — ⟨*⟩ — Oblique pr. or lft. fr. alc. — E.s. h. alc. — (Not decd. by boiling KOH sol.)
301	61	**Chloral Hydrocyanide, $CCl_3.CH(OH).CN$.** — B.p. 215–20°d. — Rhomb. tbl. fr. aq. or CS_2. — E.s. aq., alc., eth. — (Alk. dec. to chlf., HCN & formic ac.) — Warmed w. $AgNO_3$ sol. gives ppt. of AgCN.
302	60–1.5	**o-Cyanbenzyl Chloride, $ClCH_2.C_6H_4.CN$.** — ⟨*⟩ — B.p. 252°. — Glassy cryst. — S. h. aq. — W. H_2SO_4 & aq. @ 80–90° gives corresp. amide: ndl. fr. alc.; m.p. abt. 190°. — (Ber. 20, 2234).
305	62	**4-Chlor-3-nitrobenzaldehyde, $Cl(NO_2).C_6H_3.CHO$.** — ⟨*⟩ — Ndl. fr. aq. — S. in 250 pt. boiling aq. — E.s. chlf. — Diacetate: m.p. 97°; Cf. C. 1899 I. 836.
310	63	**2,4-Dichloraniline, $Cl_2.C_6H_4.NH_2$.** — ⟨**⟩ — B.p. 245° (th. i.). — $\bar{B}_2H_2PtCl_6$.
315	62–4	**Chloralammonia, $CCl_3.CH(OH).NH_2$.** — ⟨*⟩ — Ndl. — Alm. i. c. aq. — H. aq. dec. to chloroform & ammon. formate. — @ 100° dec. to chlf., formamide, etc.
320	63–4	**1^1-Chlor-4-nitrostyrene, $NO_2.C_6H_4.CCl : CH_2$.** — ⟨*⟩ — Fine *yel.* ndl. — D.s. aq.; s. org. solv.
325	64.5	**o-Nitrocinnamyl Chloride, $NO_2.C_6H_4.CH : CH.COCl$.** — ⟨T. **4**.11-a⟩ — Cryst. — E.s. eth., bz. — Corresp. amide (by passing NH_3 into bz. sol.): ndl., fr. h. aq.; m.p. 185° c.
330	55; 61	**3,5-Chlornitrotoluene, $Cl(NO_2).C_6H_3Me$.** — ⟨*⟩ — *Yel.* ndl. fr. alc. — Vol. w. st.
335	63–5; 66d.	**Quinoline Chloral, $C_9H_7N + C_2HCl_3O + H_2O$.** — ⟨*⟩ — Thick rods or tbl. fr. bz. — E.s. alc.; d.s. lgr.; i. aq.; decd. on soln. in alc.
340	64.5	**2,3,4,5-Tetrachlor-1-nitrobenzene, $Cl_4.C_6H.NO_2$.** — ⟨*⟩ — Ndl. — D.s. alc.
345	65	**1^1,1^1-Dichlor-3-nitrotoluene, $CHCl_2.C_6H_4.NO_2$.** — ⟨*⟩ — Cryst. — E.s. h. alc., eth.
350	65.4	(s)-**3,5-Dichlornitrobenzene, $Cl_2.C_6H_3.NO_2$.** — ⟨*⟩ — Thin lft. fr. alc. — Vol. w. st. — (Alc.-NH_3 no action.)
355	65–6 (sl. d.)	**Diphenylamine + Picrylchloride Comp., $Ph_2NH + 2C_6H_2(NO_2)_3Cl$.** — ⟨*⟩ — *Deep red* ndl. fr. dil. alc. — V.s. alc.
360	66–7	**Trichloraceto-o-toluide, $CCl_3.CO.NH.C_6H_4.Me$.** — ⟨*⟩ — Ndl. — D.s.c. alc. — Volat. @ 215°.
365	66–7	**Dichlorpyridine, $Cl_2.C_5H_3N$.** — Lft. fr. 50% alc. — Somewhat s. aq.; e.s. alc., dil. HCl.
370	67.5	**m-Chlorazobenzene, $Ph.N_2.C_6H_4Cl$.** — *Light or.-yel.* ndl.
375	67	**m-Cyanbenzyl Chloride, $CN.C_6H_4.CH_2Cl$.** — ⟨*⟩ — B.p. 258–60°. — Cryst. fr. h. alc.
380	67–8	**2,5-Dichlor-6-nitroaniline, $Cl_2(NO_2).C_6H_2.NH_2$.** — *Yel.* ndl. — V.s. alc.; alm. i. c. lgr.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND CHLORINE. — SOLIDS.
385	67.5	**2,3,4-Trichloraniline, $Cl_3.C_6H_2.NH_2$.** — ⟨**⟩ — B.p. 292° (th.i. 774). — Ndl. fr. lgr.
390	67	**2,5-Dichlor-3(or 4)-nitrobenzaldehyde, $Cl_2(NO_2).C_6H_2.CHO$.** — Pr.
395	67–8	**4-Chlor-2-nitrobenzaldehyde, $Cl(NO_2).C_6H_3.CHO$.** — V.s. acetone. — Gives cryst. $NaHSO_3$ comp. — W. acetone & NaOH gives violet-red dichlorindigo (D.R.P. 128727).
400	67–8	**Monochloralantipyrine, Hypnal, $C_{13}H_{15}Cl_3N_2O_3$.** — Cryst. — 100 pt. aq. @ 14° dis. 7.85 pt. — Aq. sol. col. blood-red by $FeCl_3$. — Ac. anhydr. gives acetyl deriv.: cryst. fr. alc.; m.p. 154–5°. — A dichloralantipyrine w. same m.p. is obtained fr. 1 mol. antipyrine & 2 mols. chloral.
405	68	**2,4,6-Trichlornitrobenzene, $Cl_3.C_6H_2.NO_2$.** — ⟨*⟩ — Ndl. — D.s. c. alc.; e.s. lgr., CS_2.
410	68; 65.5	**2-Chlor-4-nitrotoluene, $Cl(NO_2).C_6H_3.Me$.** — ⟨*⟩ — D.s. h. aq.; e.s. alc. — V. vol. w. st.
415	69	**2,4,6-Trichlor-3-nitrophenol. $Cl_3.C_6H(NO_2)(OH)$.** — ⟨**⟩ — Lust. ndl. — Sol. colored violet-blue by $FeCl_3$! — D.s. aq.; v.s. alc., eth., chlf., bz. — MeĀ: yel. ndl. fr. alc.; m.p. 48.5°.
420	70	**6-Chlor-2-nitrophenol, $Cl(NO_2).C_6H_3.OH$.** — ⟨**⟩ — *Yel.* ndl. w. saffron odor. V. vol. w. st. — D.s. aq.; e.s. chlf. — KĀ: red ndl. — AgĀ: carmine-red lft.
425	69.7; 70–1	**p-Chloraniline, $Cl.C_6H_4.NH_2$.** — ⟨**⟩ — B.p. 232° (th.i.). — Sp. gr. = 1.427 (19). — Rhomb. pr. fr. acetone or bz. — B̄.$C_2H_2O_4.\frac{1}{2}H_2O$: d.s. c. aq., or alc.
430	71.5	**3,4-Dichloraniline, $Cl_2.C_6H_3.NH_2$.** — ⟨**⟩ — B.p. 272°. — Ndl. fr. lgr. — Sulphate slowly decd. by boiling aq.
435	70–1	**6-Chlor-2-nitrobenzaldehyde, $Cl(NO_2).C_6H_3.CHO$.** — (D.R.P. 107501.). — V.d.s. aq.; e.s. org. solv. — W. acetone & alk. gives dichlorindigo.
440	71	**p-Nitrobenzyl Chloride, $NO_2.C_6H_4.CH_2Cl$.** — ⟨*⟩ — Reductn. w. Zn & HCl gives p-toluidine.
445	72	**4-Chlor-1,2-diaminobenzene, $Cl.C_6H_3(NH_2)_2$.** — Lft. fr. aq. — R.d.s. c. aq.; e.s. alc., eth. — Red. Ag sol. in heat. — HCl sol. gives intense red color & dark brown-red ppt. w. $FeCl_3$.
450	72.5	**Acet-m-chloranilide, $Cl.C_6H_4.NH(CO.Me)$.** — ⟨*⟩ — Ndl. fr. 50% ac. ac. — E.s. alc., bz., CS_2; v.d.s. lgr.
455	74	**4-Chlor-diphenylamine, $Cl.C_6H_4.NH.Ph$.** — Cryst. fr. dil. MeOH. — E.s. alc., eth., bz., lgr. — (Salts decd. by aq.) — Gives nitroso deriv.: tbl. fr. lgr.; e.s. eth.; m.p. 88°.
457	74–5	**2,3,4,6-Tetrachlorpyridine, C_5HNCl_4.** — Tbl. fr. 50% alc. — I. aq., acids; v.s. eth. — B.p. 130–5° (16-20 mm.).
460	75	**p-Nitrobenzoyl Chloride, $NO_2.C_6H_4.COCl$.** — ⟨G.O.-G.⟩ — B.p. 202–5° (105 mm.). — Ndl. fr. lgr.
465	76	**Ethylamine Hydrochloride, $EtNH_2.HCl$.** — ⟨**⟩ — B.p. 315–20° d. — Deliq. lft. — S. in 0.42 pt. aq. @ 14°.
470	76	**4-Chlor-2,3-dinitrotoluene, $Cl(NO_2)_2.C_6H_2Me$.** — ⟨*⟩ — *Yel.* ndl. fr. eth.
475	77.5	**2,4,6-Trichloraniline, $Cl_3.C_6H_2.NH_2$.** — ⟨**⟩ — B.p. 262° (th.i.) (746). — Ndl. fr. lgr. — E.s. alc., eth., lgr.
480	77.5	**5-Chlor-2-nitrobenzaldehyde, $Cl(NO_2).C_6H_3.CHO$.** — Lust. ndl. fr. dil. alc. — E.s. h. aq. — Vol. w. st.
485	79	**2-Chlor-4-nitrobenzaldehyde, $Cl(NO_2).C_6H_3.CHO$.** — Ndl. fr. lgr.
490	79.5	**p-Cyanbenzyl Chloride, $ClCH_2.C_6H_4.CN$.** — ⟨*⟩ — B.p. 263°. — Pr. fr. alc.
495	80	**2-Chlor-5-nitrobenzaldehyde, $Cl(NO_2).C_6H_3.CHO$.** — Lft. fr. dil. alc. — E.s. chlf.; d.s. CS_2.
500	84–5; 77–8	**3,6-Dichlor-2-aminobenzaldehyde, $Cl_2(NH_2).C_6H_2.CHO$.** — *Pale yel.* ndl. — D.s. aq.; s. $NaHSO_3$ sol. — Red. ammon. Ag. sol. v. slowly. — Acetone & NaOH sol. gives dichlorquinaldine.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND CHLORINE. — SOLIDS.
505	80	**Dichlordiphenylamine, $(C_6H_4Cl)_2NH$.** — Ndl.
510	80.5	**4-Chlor-2,6-dinitrophenol, $Cl(NO_2)_2.C_6H_2.OH$.** — ⟨**⟩ — *Yel.* cryst. fr. aq. — Taste bitter. — D.s. h. aq.; e.s. alc., chlf. — KĀ: reddish ndl.; v.d.s. c. aq. — AgĀ: long red ndl. — MeĀ: colorless ndl.; m.p. 65.4°.
515	82	**2-Chlor-4-dimethylaminobenzaldehyde, $Cl(Me_2N).C_6H_3.CHO$.** — White ndl. fr. dil. alc. — D. vol. w. st. — E.s. eth. — (Patd. as intermediate for triphenylmethane colors.)
520	82	**2,4-Dichlor-α-naphthylamine, $Cl_2.C_{10}H_5.NH_2$.** — Odor fecal! — Warts fr. alc. — Vol. w. st. — E.s. alc. — B̄.HCl: m.p. 186–7°. — Boiling w. HNO_3 oxid. to phthalic ac. (Vol. I).
525	83	**Picryl Chloride, 1-Chlor-2,4,6-trinitrobenzene, $Cl.C_6H_2(NO_2)_3$** — ⟨*⟩ — *Amber yel.* monoclin. tbl. fr. eth. — Nearly colorless ndl. fr. alc. — I. aq.; d.s. eth.; e.s. h. alc. — Ⓓ Convert into scarlet picrylaniline (No. **2**.3507), by adding 2 mol. aniline to 1 mol. in hot conc. sol. in alc. Recryst. fr. hot bz. in O-YO cryst., m.p. 177–8° unc.
530	83	**p-Chlornitrobenzene, $Cl.C_6H_4.NO_2$.** — ⟨*⟩ — B.p. 242° (761), 238.5° (753). — Rhomb. lft. — Sp. gr. = 1.380 (22°). — Red. by sol. of KOH in abs. alc. @ 100°–130° to dichlorazoxybenzene. Only slightly attacked by alc.-KOH in T. **4**.4a.
535	83	**6-Chlor-m-toluidine, $Cl.C_6H_3Me.NH_2$, (Me = 1).** — ⟨**⟩ — B.p. 241°. — Tbl.
540	83	**2,3-Dichlor-5-nitrotoluene, $Cl_2.C_6H_2.Me,NO_2$.** — ⟨*⟩ — Ndl.
545	85	**Benzoquinonechlorimide, ⌜$C_6H_4.O.NCl$⌝.** — *Gold-yel.* cryst.! — Deflag. above m.p. — Cannot be dist. — Vol. w. st. — Odor pungent & quinone-like! — E.s. h. aq., alc., eth., chlf., bz. — Burns the skin. — Ⓟ Dis. in x.s. phenol. — Add little conc. H_2SO_4 Mass colors cherry-red. KOH then gives blue sol.!
550	85	**1,4-Chlornitronaphthalene, $Cl.C_{10}H_6.NO_2$.** — Fine *light yel.* ndl. fr. alc. — (PCl_5 gives 1,4-dichlornaphthalene.)
555	85	**4,6-Dichlor-m-toluidine, $Cl_2.C_6H_2Me.NH_2$. (Me = 1).** — ⟨**⟩ — Cryst. fr. lgr. — B̄.HCl: r.d.s.
557	85–7	**2-Chlor-3-aminophenol, $Cl.C_6H_3.(NH_2)(HO)$.**
560	86–7	**4-Chlor-2-nitrophenol, $Cl(NO_2).C_6H_3.OH$.** — ⟨**⟩ — *Yel.* ndl. fr. alc. — E. vol. w. st. — Alm. i. aq.; s. alc.; e.s. eth., chlf. — NaĀ.H_2O: red pr. — AgĀ: vermilion red ppt.
565	87d.	**2-Chlorbenzoquinonechlorimide-(4), — $C_6H_3ClO.NCl$.** — *Yel.* lust. ndl. fr. alc.! — D.s. c. aq.; s.h. alc.; v.s. eth., chlf.
570	87–8	**p-Chlordiazoaminobenzene, $Cl.C_6H_4.N_2.NH.Ph$.** — Silky golden yel. ndl. fr. acetone.
575	87.5	**p-Chlorphenylhydroxylamine, $Cl.C_6H_4.NHOH$.**
580	87–8	**Acet-o-chloranilide, $Cl.C_6H_4.NH(CO.Me)$.** — Ndl. fr. dil. ac. ac.
585	87–8	**2,6-Dichlorpyridine, $Cl_2.C_5H_3N$.** — Rhomb. tbl. fr. 50% alc. — I. aq.; mod. s. c. alc.
590	88	**5,6-Dichlor-m-toluidine, $Cl_2.C_6H_2Me.NH_2$, ($Me:NH_2 = 1:3$).** — ⟨**⟩ — B.p. 292°. — Ndl.
595	88	**2,3,4,6-Tetrachloraniline, $Cl_4.C_6H.NH_2$.** — ⟨**⟩.
600	88.5	**1^2-Chloracetophenoneoxime, $Ph.C(CH_2Cl)(NOH)$.** — ⟨*⟩ — Beckmann rearrangement gives chloracetanilide.
605	88–9; 87.5	**p-Chlorazobenzene, $Ph.N_2.C_6H_4Cl$.** — *Yel.-brown* adamantine lft. fr. alc.! — Sbl. in br.-yel. ndl. — E.s. eth., bz., h.alc.
610	88; 90	**p-Chlorphenylhydrazine, $Cl.C_6H_4.NH.NH_2$.** — Ndl. fr. aq.
615	88–9	**2,3,6-Trichlornitrobenzene, $Cl_3.C_6H_2.NO_2$.** — ⟨*⟩ — E.s. alc.; d.s. lgr.
620	89–90	**p-Chlorhydrazobenzene, $Ph.NH.NH.C_6H_4Cl$.** — Ndl. — E.s. alc., eth. — Oxid. in air to p-chlorazobenzene. — Boiled w. dil. H_2SO_4 gives aniline, p-chlorazobenzene & p-chloraniline.
625	90	**2,3,5,6-Tetrachloraniline, $Cl_4.C_6H.NH_2$.** — ⟨**⟩.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND CHLORINE. — SOLIDS.
630	90–1	**2,3,5,6-Tetrachlorpyridine, $Cl_4.C_5HN$.** — B.p. 125–30° (16–20 mm.) — Cryst. — I. aq.; e.s. h. dil. alc.; i. dil. acids or bases, & without basic properties. — (No $HgCl_2$ comp.). — (Fr. pyridine & PCl_5 @ 200° w. other Cl derivs.)
635	91	**5-Chlor-2,4-dinitrotoluene, $Cl(NO_2)_2.C_6H_2Me$.** — ⟨*⟩ — *Yellowish* ndl. fr. alc. — Vol. w. st.
640	91	**Acetylchloraminobenzene, $Ph.NCl(C_2H_3O)$.** — ⟨*⟩ — Plates fr. chlf. + pet.-eth. — Alm. i. c. aq. — @ 172° suddenly changes to p-chloracetanilide; also when warmed w. abs. alc. — KOH sol. gives acetanilide, No. **2**.1975. — (Fr. HClO & acetanilide.)
645	92	**2,4,5-Trichlornitrotoluene, $Cl_3.C_6H.Me,NO_2$.** — ⟨*⟩ — Cryst. — 100 pt. abs. alc. dis. 4.5 pt. @ 20°.
647	92	**1,4-Dichlor-5-nitronaphthalene, $Cl_2.C_{10}H_5.NO_2$.** — PCl_5 gives 1,4,5-trichlornaphthalene, No. **3**.1420.
650	92–3	**5-Chlor-2-amino-1,4-dimethylbenzene, $Cl,NH_2.C_6H_2.Me_2$.** — Lft. fr. aq. — V.s. alc., eth., bz.
655	93–4	**Quinoline Hydrochloride, $C_9H_7N.HCl$.** — ⟨**⟩ — Small deliq. warts. — Misc. abs. alc., chlf.; v.s. h. eth., bz.; less s. c. eth.
660	94	**Trichloracetanilide, $Cl_3C.CO.NH.C_6H_5$.** — Scales fr. alc.
665	94	**$3,3^1$-Dichlorhydrazobenzene, $(Cl.C_6H_4)_2.N_2H_2$.** — Gypsum-like cryst. — E.s. alc.; v.s. eth.
670	94	**1,8-Chlornitronaphthalene, $Cl.C_{10}H_6.NO_2$.** — (D.R.P. 99758).
675	94	**4,7-Dichlor-α-naphthylamine, $Cl_2.C_{10}H_5.NH_2$.** — Ndl. — Alm. i. aq.; e.s. alc. — Odor unpleasant.
676	94–5	**o-Cyanbenzo-trichloride, $Cl_3.C_6H_4.CN$.** — B.p. 200°. — Glassy monoclin. cryst. fr. alc. — Conc. HCl in sealed tube gives phthalic ac.
678	95	**2,4,6-Trichlor-3-aminophenol, $Cl_3.C_6H.(NH_2)(OH)$.** — Silky ndl. — D.s. c. aq.; v.s. alc., eth., chlf., bz. — Aq.-sol. colored violet-red by $FeCl_3$.
680	95–6	**2,4,5-Trichloraniline, $Cl_3.C_6H_2,NH_2$.** — ⟨**⟩ — B.p. abt. 270°. — Ndl. fr. lgr.
685	96	**o-Chlorbenzeneazophenol, $Cl.C_6H_4.N_2.C_6H_4.OH$.** — *Red* ndl.; or w. $\frac{1}{2}H_2O$ fr. dil. alc. in yel. ndl. — E.s. alc.; i. Na_2CO_3 sol. — Benzoate: yel. lft. fr. alc.; m.p. 100°.
690	96–7	**Tetrachlormethyldiphenylamine, $(C_6H_3Cl_2)_2.NMe$.** — Pr. — E.s. alc., bz.
695	96	**5,8-Dichlor-β-naphthylamine, $Cl_2.C_{10}H_5.NH_2$.** — Ndl. fr. lgr.
700	96; 98	**Dichloracetamide, $Cl_2CH.CONH_2$.** — B.p. 233–4° (745). — V.s. alc., eth.
705	97	**$3,3^1$-(m)-Dichlorazoxybenzene, $(Cl.C_6H_4)_2N_2O$.** — Flat *yellowish* ndl. — S. in 350 pt. 85% alc. @ 18°. — Mod. s. eth.
710	98	**Chloralhydroxylamine, $CCl_3.CH(OH).NH.OH$.** — Scales fr. eth. — E.s. alc., eth.; d.s. chlf., bz. — Evapn. of aq. sol. dec. to chloral & hydroxylamine hydrochloride.
715	98	**2,6-Dinitrobenzoyl Chloride, $(NO_2)_2.C_6H_3.COCl$.** — ⟨G.O.-G.⟩ — *Yellowish* plates.
720	98	**1,4-Chlornaphthylamine, $Cl.C_{10}H_6.NH_2$.** — Odorless when pure & colors only slowly in air.
725	98	**2,4,6-Trichlor-3-nitroaniline, $Cl_3(NO_2).C_6H.NH_2$.** — Long ndl. fr. lgr.
730	99	**1,2,4,5-Tetrachlornitrobenzene, $Cl_4.C_6H(NO_2)$.** — ⟨*⟩ — B.p. 304° d. — Ndl. fr. alc. — Sp. gr. = 1.744 @ 25°. — I. c. spirit.
735	100	**4,6-Dichlor-2-nitroaniline, $Cl_2(NO_2).C_6H_2.NH_2$.** — *Or.-yel.* ndl. — E.s. alc., eth., lgr.
740	100	**3,4,5-Trichloraniline, $Cl_3.C_6H_2.NH_2$.** — ⟨**⟩ — Ndl. fr. dil. alc.
745	abt. 100	**N-Methyltetrahydroquinoline Hydrochloride, $C_9H_{10}NMe.HCl$.** — ⟨**⟩ — E.s. alc., chlf.; v.d.s. eth. — (Corresp. B: b p. 242–4°, 720 mm.; No. **2**.1384.)
750	100–1; 104	**2-Nitro-4-chloracetanilide, $(NO_2),Cl.C_6H_3.NH.CO.Me$.** — *Yel.* ndl.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND CHLORINE. — SOLIDS.
755	101	**3,3^1-Dichlorazobenzene, $(Cl.C_6H_4)_2.N_2$.** — *Or.-red* ndl. fr. alc. — D.s. c. alc.
760	101	**4-Chlor-2,6-dinitrotoluene, $Cl(NO_2)_2.C_6H_2Me$.** — Ndl. fr. alc.
765	101	**3,6-Dichlor-1,4** (or **2**)**-dinitrobenzene, $Cl_2.C_6H_2(NO_2)_2$.** — ⟨*⟩ — B.p. 318°. — Boiled w. Na_2CO_3 sol. gives a chlordinitrophenol, m.p. 70°.
770	100–1; 107.5	**Trichlorethylidenediphenylamine, $CCl_3.CH(NH.Ph)_2$.** — ⟨*⟩ — Pr. fr. eth.-alc. — I. aq. (decd. by boiling w. aq.). — Acids dec. v. e., freeing aniline. — (Fr. aniline & chloral.)
775	102; 99	**2-Amino-5-chlordiphenylamine, $Ph.NH.C_6H_3.Cl,NH_2$.** — Pr. fr. lgr. — Ndl. fr. dil. alc. — E.s. eth., chlf., bz. — (Rosinduline intermediate, C. 1901 I, 154.)
780	103.5	**1,2,4-Trichlordinitrobenzene, $Cl_3.C_6H.(NO_2)_2$.** — ⟨*⟩ — B.p. 335°. — Sp. gr. = 1.850. — Yel. pr. fr. alc. — I. c. alc.
785	103	**4,6-Dichlor-1,3-dinitrobenzene, $Cl_2.C_6H_2.(NO_2)_2$.** — ⟨*⟩ — Pale *greenish-yel.* pr. — KOH sol. gives chlordinitrophenol.
790	103	**4-Chlor-3-nitroaniline, $Cl(NO_2).C_6H_3.NH_2$.** — Thin (yel.?) ndl. fr. h. aq. — Mod. s. h. aq.; e.s. alc., eth., chlf.; d.s. lgr. — $\bar{B}_2.H_2PtCl_6$: red cryst.; dec. abt. 270° without melting.
795	103–4	**2,3-Dichlorindole, $\ulcorner C_6H_4.NH.CCl : CCl \urcorner$.** — Lust. lft. fr. h. aq. — Odor pungent, fecal! — Vol. w. st. — R.d.s. h. aq.; v.s. alc., eth., lgr., bz. — V. stable. — Neutral. — ("No picrate.")
800	102; 79–80	**Trichloracet-p-toluide, $Cl_3C.CO.NH.C_6H_4.Me$.** — ⟨*⟩ — Pr. — S. alc.
805	104	**2,5-Dichlor-1,3-dinitrobenzene, $Cl_2.C_6H_2.(NO_2)_2$.** — ⟨**⟩ — B.p. 312°, sl. d. — Lft. — Alm. i. c. alc. — Boiled w. Na_2CO_3 sol. gives a chlordinitrophenol, m.p. 80°.
810	104	**5,8-Dichlor-α-naphthylamine, $Cl_2.C_{10}H_5.NH_2$.** — Ndl. fr. alc.
815	104–5	**Py-2,3-Dichlorquinoline, $Cl_2.C_9H_5N$.** — Cryst. fr. dil. alc. — I. aq., alk.; e.s. alc., eth., bz. — Odor like quinoline. — (V. weak base.)
820	104–5	**2,5-Dichlorbenzaldehydephenylhydrazone, $Cl_2.C_6H_3.N_2H.Ph$.**
825	105	**2-Chlor-4-nitraniline, $Cl(NO_2).C_6H_3.NH_2$.** — *Yel.* ndl. — (D.R.P. 109189.)
827	105–6	**(cis-trans)-Isochloralimide, $(Cl_3.CH : NH)_3$.** — ⟨*⟩ — Pr. — Conc. HCl splits at once to chloral (No. **3**.2420) & NH_3.
828	106	**8-Chlor-1,5-dinitronaphthalene, $Cl.C_6H_5.(NO_2)_2$.** — Long yel. ndl. — W. PCl_5 gives 1,4,5-trichlornaphthalene, No. **3**.1420.
830	107	**3,3^1-Dichlordiazoaminobenzene, $Cl.C_6H_4.N_2.NH.C_6H_4Cl$.** — *Yel.* mic. ndl. fr. bz. + lgr.
835	109	**4-Chlor-2-nitromethylaniline, $Cl(NO_2).C_6H_3.NHMe$.** — *Red.-br.* pyr. fr. alc.
837	109.5°	**α-Naphthoquinonechlorimide, $C_{10}H_6NOCl$.** — Egg-yel. hair-like ndl. fr. alc. — Mod. s. c. alc.; e.s. eth , lgr., bz.
840	110	**n-Chloracetamide, $Me.CO.NHCl$.** — ⟨*⟩ — S. eth. — Hydrochloric ac. dec. to acetamide & Cl.
845	110d.	**Tetrachlorpyrrole, $Cl_4.C_4.NH$.** — Lft. fr. lgr. — D.s. aq.; e.s. alc., eth.; e.s. alk. or alk. carb. — V. vol. — V. unstable, completely carbonizing after a few days! — S. oil of vit. on gentle warming w. intense red-brown color, changing to violet w. few drops aq., and w. more aq. to green; then w. KOH colors intense or.-yel.
850	110–11; 96	**6-Chlor-2,4-dinitrophenol, $Cl(NO_2)_2.C_6H_2OH$.** — ⟨**⟩ — *Yel.* lft. fr. alc. — 6-sided tbl. fr. chlf. — Taste v. bitter! Dust or vapor causes violent sneezing! (Like several of the chlornitrophenols.) — D.s. h. aq.; s. alc., eth.; 100 pt. aq. @ 10° dis. .052 pt.
855	110–11	**2-Chlor-2,4-nitrophenol, $Cl(NO_2).C_6H_3.OH$.** — ⟨**⟩ — Long lust. ndl. — Sl. vol. w. st. — V.s. alc., eth., chlf. — $K\bar{A}.H_2O$: brown e.s. ndl. — (Z. 1871, 339; Ann. spl. **7**, 195; Z. 1871, 338; M. **6**, 527.)
860	111	**1,5-Chlornitronaphthalene, $Cl.C_{10}H_6.NO_2$.** — (D.R.P. 99, 758).
865	111–12	**Chloracet-o-toluide, $CH_2Cl.CO.NH.C_6H_4.Me$.** — Ndl. fr. dil. alc.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND CHLORINE. — SOLIDS.
870	112	**1-Chlorcarbostyril, $\ulcorner C_6H_4.CH : CH.CO.NCl \urcorner$.** — ⟨*⟩ — Trimet. ndl. — E.s. alk. or ac. — Pptd. fr. alk. sol. by CO_2. — Boiled w. alk. gives carbostyril, No. **2**.2450. — Sometimes changes to isomer of m.p. 206°.
875	d. abt. 115	**Pyridine-Picryl-Chloride, $C_5H_5N.C_6H_2(NO_2)_3Cl$.** — ⟨*⟩ — *Yellowish* powd. fr. toluene. — D.s. c. bz., eth. — Alk. colors alc. sol. red. — In (HO) solvents or in air changes to pyridine picrate.
877	113; 116	**Benzoylchloramide, $C_6H_5.CO.NHCl$.** — Pr. fr. aq. — I. alc., bz.
878	115	**2-Chlor-4-nitrobenzoyl Chloride, $Cl(NO_2).C_6H_3.COCl$.** — ⟨G.O.-G.⟩ — Yel.-brown. — Corresp. acid: No. **50**.1090. — Corresp. amide: scales fr. alc.: m p. 172°.
880	115	**4-Chlor-2-nitroaniline, $Cl(NO_2).C_6H_3.NH_2$.** — Flat *or.-red* ndl. fr. lgr.!
885	115–16	**2,5-Dichlor-4-nitrophenol, $Cl_2(NO_2).C_6H_2.OH$.** — ⟨**⟩ — Lust. ndl. fr. h. aq. — D. vol. w. st. (Taste *not* bitter.)
890	115	**2-Nitro-5-chloracetanilide, $(NO_2)Cl.C_6H_3.NH.CO.Me$.** — Ndl. — R.d.s. alc.
895	115–16	**Chloralformamide, "Chloralamide", $CCl_3.CH(OH).NH.CHO$.** — ⟨*⟩ — Odorless, tasteless cryst. — S. aq.; e.s. alc., eth. — (Hypnotic, D.R.P.50, 586.)
900	116	**7-Chlor-1-nitronaphthalene, $Cl.C_{10}H_6.NO_2$.** — *S.-yel.* ndl. fr. alc. — (PCl_5 gives 1,7-dichlornaphthalene, No. **3**.580).
905	116–7	**2-Chlor-4-nitromethylaniline, $Cl(NO_2)C_6H_3.NHMe$.** — *S.-yel.* ndl.
910	116; 117–8	**Dichloracetanilide, $Cl_2CH.CO.NH.C_6H_5$.** — Scales fr. h. aq. — I. c. aq.; v.d.s. h. aq.; e.s. alc., eth., CS_2. — S. in NaOH sol. & repptd. by acid.
915	116–7	**5,7-Dichlor-α-naphthylamine, $Cl_2.C_{10}H_5.NH_2$.** — Mic. ndl. — $\bar{B}$.HCl : m.p. 204°–5°.
920	117–8; 116	**α,α-Dichlorpropionamide, $Me.CCl_2.CO.NH_2$.** — Monoclin. lft. fr. dil. alc. — Sbl. — V.s. alc.; less s. aq.
925	117–8	**2-Chlor-5-nitroaniline, $Cl,(NO_2).C_6H_3.NH_2$.** — *Yel.* ndl.
930	118	**Benzoyl-m-chloranilide, $Cl.C_6H_4.NH.CO.Ph$.** — Ndl.
935	118	**3-Chlor-p-acettoluide, $Cl.C_6H_3Me.NH.CO.Me$.** — Triclin. tbl.
940	118	**2,3,4,5-Tetrachloraniline, $Cl_4.C_6H.NH_2$.** — ⟨**⟩ — E.s. alc., eth., bz., gl. ac. ac.
942	119	**1,6-Dichlor-4-nitronaphthalene, $Cl_2.C_{10}H_5.NO_2$.** — *Gold-yel.* ndl. — S.h. alc., gl. ac. ac. — PCl_5 gives 1,4,6-trichlornaphthalene, No. **3**.675.
945	119–20	**o-Nitrophenylchlorlactic Ac., $NO_2.C_6H_4.CH(OH).CHCl.CO_2H$.** — Cryst. mass pptd. fr. bz. sol. by lgr. — S. eth. — W. Na-amalgam gives indole, No. **2**.1546. — (Alc.-KOH gives KCl etc.)
950	119c.	**9-(meso)-Chloracridine, $Cl.C_{13}H_8N$.** — Ndl. fr. alc. — Sbl. — V.s. alc. — On boiling w. aq. changed mostly to acridone, (No. **2**.3946). — $\bar{B}$.Pk: yel. lft.; m.p. a. 300°. — (D.R.P. 122607.)
955	119.5; 116	**Chloracetamide, $ClCH_2.CO.NH_2$.** — ⟨*⟩ — B.p. 224–5° (743) sl. d. — Thick monoclin. pr. — S. in 10 pt. aq. @ 24°; s. in 10.5 pt. abs. alc. @ 24°.
960	120.5	**3,4-Dichloracetanilide, $Cl_2.C_6H_3.NH(CO.Me)$.** — Sm. ndl. — Mod. s. 50% ac. ac.
962	121	**Trichloracetchloramide, $CCl_3.CO.NHCl$.** — ⟨*⟩ — Lft. fr. eth. — Taste v. unpleasant. — Sbl. — Vol. w. st. — I. aq.; e.s. alc., eth. — Boiled w. KOH sol. gives NH_3, K_2CO_3 & KCl.
965	121.2	**4,6-Dichlor-2-nitrophenol, $Cl_2(NO_2).C_6H_2.OH$.** — ⟨**⟩ — *Yel.* lft. fr. alc. — D.s. aq.; e.s. alc., eth., bz., chlf. — K$\bar{A}$ or K$\bar{A}$.H_2O: chrome-red flat ndl.
970	121–2	**2,3-Dichlor-4,6-dinitrotoluene, $Cl_2.C_6H.Me(NO_2)_2$.** — ⟨*⟩ — Ndl. fr. wood spirit.
975	121–2	**Methylaniline Hydrochloride, $Ph.NHMe.HCl$.** — ⟨**⟩ — Ndl. fr. chlf. + eth. — V.s. chlf.; e.s. alc.; i. eth., bz. — (By passing dry HCl into sol. of the amine in abs. eth.)
980	120–2	**2,3,4-Trichloracetanilide, $Cl_3.C_6H_2.NH.CO.Me$.** — Ndl. — V.e.s. alc., bz.
985	122	**4,4^1-Dichlorhydrazobenzene, $(Cl.C_6H_4)_2.N_2H_2$.** — Cryst. — S. alc. — Boiled

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND CHLORINE. — SOLIDS.
		w. HCl dec. smoothly to $4,4^1$-dichlorazobenzene, No. **50**.1455 & p-chloraniline, No. **50**.425.
990	123.5	**2,6-Dichlor-p-phenylenediamine, $Cl_2(NH_2)_2.C_6H_2$.** — Flat ndl.
995	d. & deflag. 124	**Benzoquinonedichlordiimide, $\ulcorner C_6H_4.NCl.NCl \urcorner$.** — Ndl. fr. aq. — Alm. i. c. aq.; d.s. h. aq.; e.s. h. alc., eth., bz. — S. unchanged in conc. H_2SO_4 or fuming HNO_3. — Sol. colors skin brown! — Reductn. by $SnCl_2$, H_2S or SO_2 gives p-phenylenediamine, No. **2**.877.
1000	124	**Pentachlorpyridine, C_5NCl_5.** — Rt. angled tbl. or thick ndl. — I. aq.; v.d.s. c. alc.; d.s. h. alc. — E. vol. w. st. — (Without basic properties.)
1005	124.5	**$4,4^1$-Dichlordiazoaminobenzene, $Cl.C_6H_4.N_2.NH.C_6H_4.Cl$.** — *Ochre-colored* ndl. fr. bz. + lgr.
1010	124-5	**3-Chlor-6-nitroaniline, $Cl(NO_2).C_6H_3.NH_2$.** — *Yel.* ndl.
1015	125	**2,6-Dichlor-4-nitrophenol, $Cl_2(NO_2).C_6H_2(OH)$.** — ⟨**⟩ — Alm. colorless cryst. fr. aq. — V.d. vol. w. st. — Alm. i. aq.; d.s. alc., bz. — KĀ.H_2O: or.-red ndl.
1020	126.5	**$2,4,2^1,4^1$-Tetrachlordiazoaminobenzene, $Cl_2.C_6H_3.N_3H.C_6H_3.Cl_2$.** — Hair-like ndl. — V.d.s. h. alc., eth.; e.s. alc.-KOH. — (Fr. 2,5-dichloraniline & HNO_2.)
1025	126-7	**4-Chlor-3-nitrophenol, $Cl(NO_2).C_6H_3.OH$.** — ⟨**⟩ — Ndl. fr. aq.
1030	127	**p-Chlorbenzyldehydephenylhydrazone, $Cl.C_6H_4.N_2H.Ph$.** — Ndl. fr. dil. alc. — V.s. alc., eth., chlf.
1035	129-30; 125	**5-Chlor-8-oxyquinoline, $HO.C_6H_2Cl.C_3H_3N$.** — Ndl. fr. MeOH. — B̄.HCl: yel. ndl.; m.p. 253°.
1040	129.5	**1,3,5-Trichlordinitrobenzene, $Cl_3.C_6H.(NO_2)_2$.** — ⟨*⟩ — Pr. fr. alc. — V.s. bz., chlf., CS_2.
1045	131	**o-Chlorbenzo-p-toluide, $Cl.C_6H_4.CO.NH.C_6H_4.Me$.** — Cryst. — I. aq.; e.s. alc.
1050	132	**2,5-Dichloracetanilide, $Cl_2.C_6H_3.NH(CO.Me)$.** — Sm. ndl. fr. 50% ac. ac. — E.s. alc.; d.s. dil. ac. ac.; v.d.s. c. bz.
1055	132.5	**4-Chlor-4^1-nitroazobenzene, $Cl.C_6H_4N_2.C_6H_4.NO_2$.** — *Pale yel.* ndl. — D.s. c. alc.; s. eth.; e.s. gl. ac. ac. — Sn + HCl reductn. gives p-chloraniline, No. **50**.425, & p-phenylenediamine, No. **2**.877.
1060	132-3	**$3,3^1$-Dichlorbenzidine, $[Cl(NH_2).C_6H_3.-]_2$.** — ⟨*⟩ — Ndl. fr. alc. — Alm. i. aq. — B̄ 2HCl: ndl.; d.s. aq.; e.s. alc.
1065	133	**3,4-Dichlorbenzamide, $Cl_2.C_6H_3.CONH_2$.** — ⟨*⟩ — Ndl.
1070	134.5; 132-3	**m-Chlorbenzamide, $Cl.C_6H_4.CONH_2$.** — ⟨*⟩ — Ndl. — E.s. alc., h. aq.
1075	134.5	**Chloracetanilide, $CH_2Cl.CO.NHPh$.** — ⟨*⟩ — Ndl. fr. aq. — Sbl. — E.s. eth. — Heated w. 1 mol. alc.-KOH gives diphenyl-α,γ-diacipiperazine.
1080	134-5	**m-Chlorbenzaldehydephenylhydrazone, $Cl.C_6H_4.N_2H.Ph$.** — Ndl. fr. alc. — E.s. alc., eth., chlf.; less s. lgr.
1085	135	**m-Chlorbenzeneazophenol, $Cl.C_6H_4.N_2.C_6H_4OH$.** — *Yel.* — Also cryst. w. $\frac{1}{2}H_2O$ in violet ndl. fr. dil. alc. — E.s. w. yel. color in alc., eth., chlf., bz. — Benzoate: yel. scales.; m.p. 118°.
1090	136-7	**2-Chlor-4-nitrobenzoic Ac., $Cl(NO_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 201.5. — Unchanged by alc.-KOH @ 200°. — Chloride: yel.-brown; m.p. 115°. — Amide: scales fr. alc.; m.p. 172°. — Anilide: amorph.; m.p. 168°.
1095	136; 137	**$2,2^1$-Dichlorazobenzene, $(Cl.C_6H_4-)_2N_2$.** — *Or.* ndl. fr. alc.
1100	137-9	**Picryl-m-chloraniline, $C_6H_2(NO_2)_3.NH.C_6H_4Cl$.** — *Or.-yel.* cryst. powd.
1105	137-8	**3-Chlor-6-nitrobenzoic Ac., $Cl(NO_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 201.5. — Amide: m.p. 154°.
1110	137	**3,6-Dichlor-2-nitrobenzaldehyde, $Cl_2(NO_2).C_6H_2.CHO$.** — Pearly cryst. — W. acetone & NaOH sol. gives tetrachlorindigo! — (D.R.P. 33064.)
1115	137	**uns-Ethylphenylhydrazine Hydrochloride, $Ph,EtN.NH_2.HCl$.** — ⟨**⟩ — **Lft.** — E.s. bz., eth. — (Corresp. B̄: b.p. 237° (th.i.); No. **2**.1360.)

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND CHLORINE. — SOLIDS.
1120	138–9	**4-Chlor-2-nitrobenzoic Ac., $\mathrm{Cl(NO_2).C_6H_3.CO_2H}$.** — ⟨G.O.-E.⟩ — N. Eq. 201.5. — Long ndl. — $\mathrm{Ba\bar{A}_2.4H_2O}$: ndl.; r.d.s. c. aq.
1122	138–9	**1,7-Dichlornitronaphthalene, $\mathrm{Cl_2.C_{10}H_5.NO_2}$.** — Asbestos-like ndl. fr. MeOH + little glycerine.
1125	139; 143	**4-Nitro-2-Chloracetanilide $\mathrm{(NO_2), Cl.C_6H_3.NH.CO.Me}$.** — Ndl.— D.s. alc.
1130	136–7; 142–3	**α-Naphthoquinonedichlordiimide, $\mathrm{C_{10}H_6(NCl)_2}$.** — *Yel.* ndl. fr. alc. — Intense odor of quinone! — $\mathrm{SnCl_2}$ gives 1,4-naphthylenediamine.
1135	140	**5-Chlor-o-acettoluide, $\mathrm{Cl.C_6H_3Me.NH.CO.Me}$.** — Pearly lft. fr. dil. alc. — (Fr. chlorination of o-acettoluide.)
1140	140.5; 141; 139; 142.4 (c)	**o-Chlorbenzamide, $\mathrm{Cl.C_6H_4.CO.NH_2}$.** — Ndl. fr. aq. — V.d.s. c. aq.; e.s. alc., eth., h. aq. — (Corresp. ac.: m.p. 137°, No. **3**.1470.)
1145	141	**4,5,6-Trichlordinitrotoluene, $\mathrm{Cl_3.C_6.Me,(NO_2)_2}$.** — ⟨*⟩ — *Yellowish* ndl. fr. alc. — Alc.-$\mathrm{NH_3}$ @ 100° gives a trichlornitrotoluidine, m.p. 192°.
1150	141	**2,4,6,2^1,4^1,6-Hexachlordiazoaminobenzene, $\mathrm{Cl_3.C_6H_2.N_3H.C_6H_2Cl_3}$.** — Ndl. fr. alc. — (Fr. trichloraniline, HCl & amyl nitrite.)
1155	141	**Trichloracetamide, $\mathrm{Cl_3C.CONH_2}$.** — ⟨*⟩ — B.p. 238–9°. — Tbl. — D.s. aq.; e.s. alc.; v.e.s. eth.
1160	141.5	**2,5,2^1,5^1-Tetrachlorazoxybenzene, $\mathrm{(Cl_2.C_6H_3)_2N_2O}$.** — Sm. *light yel.* ndl.
1165	141–2	**4-Nitro-3-chloracetanilide, $\mathrm{(NO_2),Cl.C_6H_3.NH.CO.Me}$.** — *Light yel.* ndl. fr. bz. — D.s. bz.
1167	142	**1,5-Dichlor-4-nitronaphthalene, $\mathrm{Cl_2.C_{10}H_5.NO_2}$.** — *S.-yel.* pr. fr. gl. ac. ac. — D.s. alc. — $\mathrm{PCl_5}$ gives 1,4,5-trinitronaphthalene, No. **3**.1420.
1170	143–4	**3,6-Dichlor-2-nitrobenzoic Ac., $\mathrm{Cl_2(NO_2).C_6H_2.CO_2H}$.** — ⟨G.O.-E.⟩ — N. Eq. 236. — Rhomb. tbl. fr. bz.
1175	143	**2,4-Dichloracetanilide, $\mathrm{Cl_2.C_6H_3.NH.(CO.Me)}$.** — Monoclin. cryst. fr. alc.
1180	144.7	**4-Chlor-2,6-dinitroaniline, $\mathrm{Cl(NO_2)_2.C_6H_2.NH_2}$.** — *Or.-yel.* ndl. — Warmed w. KOH sol. gives chlordinitrophenol, No. **50**.510, easily.
1185	145	**Cyanuric Chloride, $\mathrm{(CN.Cl)_3}$.** — ⟨T. **4**.4-a⟩ — B.p. 190°. — Cryst. fr. eth. — Odor strong, like mouse excrement! — V. toxic. — Aq. dec. v. slowly to HCl & cyanuric ac. (No. **2**.518). — S. warm abs. eth.; e.s. chlf. — Alc. gives cyanuric ac. & EtCl.
1190	146d.	**2,3,5-Trichlor-4-nitrophenol, $\mathrm{Cl_3.C_6H(NO_2)(OH)}$.** — ⟨**⟩ — Ndl. — Dust provokes violent sneezing! — Et$\bar{\mathrm{A}}$: ndl.; m.p. 68–9°.
1195	146	**Pentachlornitrobenzene, $\mathrm{Cl_5.C_6.NO_2}$.** — B.p. 328° (sl. d.). — Sp. gr. = 1.718 @ 25°. — Ndl. fr. alc. — I. c. spirit.
1200	145–6; 148	**Chloracet-p-phenetidide, $\mathrm{EtO.C_6H_4.NH.CO.CH_2Cl}$.** — ⟨*⟩ — Cryst. — E.s. h. alc., bz.; v.d.s. aq.; alm. i. eth., lgr.
1202	147	**3-Chlor-5-nitrobenzoic Ac., $\mathrm{Cl(NO_2).C_6H_3.CO_2H}$.** — ⟨G.O.-E.⟩ — N. Eq. 201.5 — Ndl. — D.s. aq.; e.s. alc., eth., gl. ac. ac. — $\mathrm{Pb\bar{A}_2}$: ppt., i. aq.
1205	147	**2-Chlor-4-aminobenzaldehyde, $\mathrm{Cl(NH_2).C_6H_3.CHO}$.** — (D.R.P. 86874.) — *Yellowish* ndl.
1210	148	**5-Chlor-2-aminobenzoic Ac., $\mathrm{Cl.C_6H_3.NH_2,CO_2H}$.** — ⟨G.O.-E.⟩ — N. Eq. 171.5 — Long v.d.s. ndl. — $\mathrm{Ba\bar{A}_2}$ + 1$\frac{1}{4}$ $\mathrm{H_2O}$.
1212	148	**Succinchlorimide, $\mathrm{C_4H_4O_2NCl}$.** — ⟨*⟩ — Cryst. fr. bz. — Alk. or HCl give succinimide, No. **2**.2037.
1215	151–2; 154	**p-Chlorbenzeneazophenol, $\mathrm{Cl.C_6H_4.N_2.C_6H_4OH}$.** — *Red-yel.* ndl. fr. chlf.
1216	150	**1,3-Dichlor-α-dinitronaphthalene, $\mathrm{Cl_2.C_{10}H_4.(NO_2)_2}$.** — Cryst. fr. gl. ac. ac. w. 1 mol. $\mathrm{C_2H_4O_2}$ in fine ndl. — E.s. bz.
1217	150–5	**cis-Chloralimide, $\mathrm{(Cl_3.CH : NH)_3}$.** — ⟨*⟩ — Orthorhomb. cryst. — I. aq.; 100 pt. 95% alc. dis. 2 pt.; e.s. chlf., bz. — Conc. HCl splits quickly to chloral (No. **3**.2420) & $\mathrm{NH_4Cl}$.
1219	153	**2-Chlor-4-aminophenol, $\mathrm{Cl.C_6H_3.(NH_2)(OH)}$.** — Ndl. — E.s. alc., eth. — $\bar{\mathrm{B}}$.HCl: lft.; e.s. aq.

No.	Melting-point (C.°)	“ ADDITIONAL ELEMENTS ” — NITROGEN AND CHLORINE. — SOLIDS.
1220	153	**2,5-Dichlor-4-nitroaniline, $Cl_2(NO_2).C_6H_2.NH_2$.** —*Yel.* ndl. — V.e.s. alc.; alm. i. lgr.
1225	153	**Dichloracet-p-toluide, $CHCl_2.CO.NH.C_7H_7$.** — Scales fr. eth. — Sbl. undecd. — D.s. c. aq., eth.; v.s. abs. alc. — Cryst. unch. fr. h. acids.
1230	153–4	**3-Nitro-6-chloracetanilide, $(NO_2),Cl.C_6H_2$ NH.CO.Me.** — Ndl. — R.d.s. alc.
1231	154	**3-Chlor-6-nitrobenzamide, $Cl(NO_2).C_6H_3.CO.NH_2$.** — Ndl. fr. eth.
1232	154–5	**δ-Tetrachlornitronaphthalene, $Cl_4.C_{10}H_3.NO_2$.** — Rhomb. tbl. fr. toluene + alc. — PCl_5 gives β-pentachlornaphthalene.
1235	155	**4,4^1-(p)-Dichlorazoxybenzene, $(Cl.C_6H_4)_2.N_2O$.** — *Pale yel.* ndl. — Cryst. fr. bz. in cryst. contg. bz. — D.s. c. alc.; e.s. eth. — $SnCl_2$ gives a dichlorbenzidine: m.p. 60°. (Ber. **17**, 464.)
1240	155	**2,5-Dichlorbenzamide, $Cl_2.C_6H_3.CONH_2$.** — Wooly ndl. — Mod. s. boiling aq.
1242	156–7	**2,3-Dichloracetanilide, $Cl_2.C_6H_3.NH.CO.Me$.** — Ndl. — R.d.s. bz.; more s. alc.
1245	156–7	**3-Chlor-4-nitroaniline, $Cl(NO_2).C_6H_3.NH_2$.** — *Yel.* lft.
1250	157–8	**n-Propylamine Hydrochloride, $Pr.NH_2.HCl$.** — ⟨**⟩ — Cryst. — V.s. aq. Sol. neut. to litmus.
1255	157–9	**6-Chlor-o-acettoluide, $Cl.C_6H_3.Me,COMe$.**
1260	158	**α-Phenylethylamine Hydrochloride, $MeCHPh.NH_2.HCl$.** — ⟨**⟩.
1262	158	**1,3-Dichlor-β-dinitronaphthalene, $Cl_2.C_{10}H_4.(NO_2)_2$.** — Ndl. — D.s. alc.
1263	158	**1,4-Dichlordinitronaphthalene, $Cl_2.C_{10}H_4.(NO_2)_2$.** — Long *yel.* ndl. — D.s. alc.; more s. gl. ac. ac. — Sp. gr. = 1.48.
1265	158–9	**Picryl-o-chloraniline, $Cl.C_6H_4.NH.C_6H_2.(NO_2)_3$.** — *Or.-yel.* cryst.
1267	159d.	**2,3,5(?)-Trichlor-4-aminophenol, $Cl_3.C_6H.(HO)(NH_2)$.** — Lust. ndl. fr. alc. — D.s. c. aq.; more s. alc., eth., h. aq. — $\bar{B}$.HCl: lft.; e.s. dil. HCl; loses all HCl on boiling aq. sol.
1270	160	**Isobutylamine Hydrochloride, $Me_2CH.CH_2.NH_2.HCl$.** — ⟨**⟩ — S. in 0.75 pt. aq. @ 15°.
1275	161	**2-Chlor-6-nitrobenzoic Ac., $Cl(NO_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 201.5. — Ndl. — E.s. aq.
1280	161	**Chloracet-α-naphthalide, $Cl.CH_2.CO.NH.C_{10}H_7$.** — Ndl. fr. alc.
1285	161–2	**2,4,2^1,4^1-Tetrachlorazobenzene, $(Cl_2.C_6H_3-)_2N_2$.** — *Salmon-colored* ndl. — S. alc.; e.s. bz. — Reduction gives 2,4-dichloraniline, No. **50**.310.
1290	162	**Piperylhydrazine Hydrochloride, $C_5H_{10}N.NH_2.HCl$.** — ⟨**⟩ — Tbl. fr. alc. — E.s. aq., h. alc.; i. eth., bz. — (Corresp. $\bar{B}$: b.p. 146°, 728 mm.; No. **2**.1179.)
1295	162–3	**5,6-Dichlor-2-nitroaniline, $Cl_2(NO_2).C_6H_2.NH_2$.** — *Yel.* ndl.
1300	162–3	**5-Chlornitrosalicylic-(1) Ac., $Cl(NO_2)(HO).C_6H_2.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 217.5. — Ndl. — E.s. aq. — $Ba\bar{A}_2$: d.s. or.-red ndl. — Amide: cryst.; d.s. aq.; e.s. alc.; m.p. 199°.
1305	162–4	**p-Tolueneazo-α-naphthylamine Hydrochloride, $MeC_6H_4.N_2.C_{10}H_6.NH_2HCl$.** — ⟨**⟩ — *Black-blue* ndl. — (Corresp. base: ruby-red lft.; m.p. 145°.)
1310	162; 164	**Chloracet-p-toluide, $CH_2Cl.CO.NH.C_7H_7$.** — Ndl. — E.s. eth., h. alc. — (Fr. chloracetyl chloride & p-toluidine).
1315	163	**2,2^1-Dichlorbenzidine, $(Cl,(NH_2).C_6H_3)_2$.** — Flat pr. fr. alc. — S. alc.; v.s. eth. — $\bar{B}$.2HCl: lft.; mod. s. aq.
1320	165	**2-Chlor-5-nitrobenzoic Ac., $Cl(NO_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 201.5 — Monoclin. ndl. — S. in 277 pt. aq. @ 15°; v.s. alc., eth., bz. — $Ba\bar{A}_2.3\frac{1}{2}Aq.$; yel. ndl.; v.s. aq., alc. — $Me\bar{A}$: m.p. 73°. — Amide: ndl. fr. aq.; m.p. 178°.
1322	165–6	**2,6-Dichlor-4-aminophenol, $Cl_2.C_6H_2.(NH_2)(OH)$.** — Ndl. fr. aq. — Cautiously heated sbl. — D.s.c. aq.; v.s. alc.; d.s. bz. — $\bar{B}$.HCl: ndl.; e.s. aq., alc.
1325	167	**a,a-Phenylbenzylhydrazine Hydrochloride, $Ph.CH_2.NPh.NH_2.HCl$.** — ⟨**⟩ — Ndl. — D.s. aq. — (Corresp. $\bar{B}$: m.p. 26°; No. **2**.532.)

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND CHLORINE. — SOLIDS.
1330	167–8	**Skatole Hydrochloride, $2C_9H_9N.HCl$.** — ⟨**⟩ — D.s. aq.; e.s. alc.; i. eth. — Corresp. $\bar{B}$: No. **2**.830.
1335	167.5	**2,4,5-Trichlorbenzamide, $Cl_3.C_6H_2.CONH_2$.** — Ndl. fr. bz. — D.s. h. aq.; e.s. abs. alc.
1340	164; 170	**2,5-Dichlor-p-phenylenediamine, $Cl_2(NH_2)_2.C_6H_2$.** — Lust. pr. fr. aq.
1345	169–70	**Picryl-p-chloraniline, $C_6H_2(NO_2)_3.NH.C_6H_4Cl$.** — *Or.* cryst.
1347	169.5	**1,2-Dichlordinitronaphthalene, $Cl_2.C_{10}H_4.(NO_2)_2$.** — Light yel. ndl. fr. gl. ac. ac. — V.d.s. eth.; e.s. h. gl. ac. ac.
1350	170–1	**3,5-Dichlor-4-nitraniline, $Cl_2(NO_2).C_6H_2.NH_2$.** — *Yel.* ndl.
1355	171	**Dimethylamine Hydrochloride, $Me_2NH.HCl$.** — ⟨**⟩ — E.s. aq., chlf. (unlike salt of methylamine). — Corresp. $\bar{B}$: No. **2**.1061; b.p. 7.2°.
1360	171–2	**3,5,3^1,5^1-Tetrachlorazoxybenzene, $(Cl_2.C_6H_3)_2N_2O$.** — Cryst., (prob. pale yellow).
1365	171–2	**3-β-Methylpiperidine (β-Pipecoline) Hydrochloride, $C_6H_{13}N.HCl$.** — ⟨**⟩ — Ndl. fr. bz. — Corresp. $\bar{B}$: No. **2**.1144; b.p. 125–6° c.
1367	172	**2-Chlor-4-nitrobenzamide, $Cl.C_6H_3(NO_2).CONH_2$.** — Scales fr. alc.
1370	173; (151)	**Di-β-naphthylcarbamyl Chloride, $(C_{10}H_7)_2.N.CO.Cl$.** — ⟨*⟩ — Cauliflower-like mass fr. bz. + alc. — I. c. alc.; e.s. bz. — (Fr. $COCl_2$ & β-naphthylamine.)
1375	173–4	**Pyrroline Hydrochloride, $C_4H_7N.HCl$.** — ⟨**⟩ — Pr. fr. abs. alc. — Deliq. in air. — E.s. h. alc.; i. abs. eth. — Corresp. $\bar{B}$: b.p. 90–1°; No. **2**.1096.
1380	174	**3-Chlor-4,6-dinitroaniline, $Cl(NO_2)_2.C_6H_2.NH_2$.** — *Or.-yel.* ndl. fr. alc.
1382	174–5	**5-Chlor-2-nitrocinnamic Ac., $Cl(NO_2).C_6H_3.CH : CH.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 227.5. — Ndl. fr. dil. alc. — E.s. alc., eth., chlf.; d.s. bz.; alm. i. lgr. — $Ba\bar{A}_2.H_2O$: pulv. ppt. — $Et\bar{A}$: ndl. fr. alc; m.p. 62°.
1385	172.5; 173–5; 175; 179–80	**Acet-p-chloranilide, $Cl.C_6H_4.NH.COMe$.** — Tbl. fr. alc. — E.s. alc., eth., CS_2.
1390	173–4; 181	**2,3,4,6-Tetrachloracetanilide, $Cl_4.C_6H.NH.CO.Me$.** — Ndl. — E.s. alc.; d.s. 50% ac. ac. — (Not decd. by h. conc. H_2SO_4).
1395	175	**2,6-Dichloracetanilide, $Cl_2.C_6H_3.NH.CO.Me$.** — Ndl. — E.s. alc.; 50% ac.ac.
1400	172–5	**Ethylaniline Hydrochloride, $PhNHEt.HCl$.** — ⟨**⟩ — Ndl. — S. c. aq. — Corresp. $\bar{B}$: No. **2**.1270.
1405	175d.	**3-Aminopyridine Hydrochloride, $C_5H_6N_2.2HCl$.** — ⟨**⟩ — Lust. tbl. — Corresp. $\bar{B}$: v.s. aq.; m.p. 64°; No. **2**.637.
1410	175d.	**Semicarbazide Hydro chloride, $NH_2.CO.NH.NH_2.HCl$.** — ⟨**⟩ — Pr. fr. dil. alc. — E.s. aq.; i. abs. alc., eth. — Corresp. $\bar{B}$: m.p. 96°; No. **2**.734.
1415	175	**4,5-Dichlor-2-nitraniline, $Cl_2.(NO_2).C_6H_2.NH_2$.** — *Yel.* ndl.
1420	175; 179; 178.3c.	**p-Chlorbenzamide, $Cl.C_6H_4.CONH_2$.**
1422	178	**1,3-Dichlortrinitronaphthalene, $Cl_2.C_{10}H_3.(NO_2)_3$.** — *Yel.* pr. fr. gl. ac. ac. — S. chlf., h. gl. ac. ac.; d.s. alc.
1423	178	**2-Chlor-5-nitrobenzamide, $Cl(NO_2).C_6H_3.CONH_2$.** — Ndl. fr. aq.
1425	178–80	**4-Chlor-3-nitrobenzoic Ac., $Cl.(NO_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 201.5. — Ndl. — S. h. aq. — Chloride: m.p. 51°. — Amide: plates fr. alc.; m.p. 156°.
1430	179–80	**5,7-Dichlor-8-oxyquinoline, $HO.C_6HCl_2.C_3H_3N$.** — Ndl. fr. alc. — D.s. c. alc., gl. ac. ac.; e.s. NaOH sol. — Acetyl deriv.: cryst. fr. lgr.; m.p. 97–8°; sapnd. by aq.
1435	abt. 180d.	**Isatine Chloride $\ulcorner C_6H_4.N : CCl.CO \urcorner$.** — ⟨*⟩ — *Brown* ndl. — E.s. eth. w. blue color. — Dec. in moist air. — KOH gives isatine. — Zn dust + ac. ac. gives indigo-blue!
1439	180	**(β)-4-Chlor-1,8-dinitronaphthalene, $Cl.C_{10}H_5.(NO_2)_2$.** — *Pale yel.* ndl. fr. gl. ac. ac. — D.s. h. alc. — PCl_5 gives 1,4,5-trichlornaphthalene, No. **3**.1420.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND CHLORINE. — SOLIDS.
1440	abt. 180d.	**Dichlormethylformamidine,** $NH : CH.NH.CHCl_2$. — ⟨*⟩ — (Fr. HCl & HCN.) — Melts to brown-black liq. — Cryst. — I. eth., chlf. — Aq. dec. to NH_4Cl, HCO_2H & some HCN!
1445	180	**Trichlorcarbazole,** $Cl_3.C_{12}H_6N$. — Long *greenish* ndl. fr. bz. — Sbl. in long ndl. — E.s. alc., eth., chlf., bz. — S. in oil of vit. w. light green color, turned emerald green by little HCl. — "Not at. by alc.-KOH." — Picrate: red ndl. fr. bz.; m.p. 100°.
1447	180–1	**Tetrahydroquinoline Hydrochloride,** $C_9H_{11}N.HCl$. — ⟨**⟩ — Pr. fr. abs. alc. — E.s. aq., crystg. in tbl. — Corresp. base: b.p. 251° th.i.
1450	182	**3-Chlor-p-toluicamide,** $Cl,Me.C_6H_3.CONH_2$. — Glassy ndl. fr. alc. — Corresp. Ac.: No. **3**.1610; m.p. 155°.
1455	183–4	**4,4'-(p-) Dichlorazobenzene,** $(Cl.C_6H_4-)_2N_2$. — Silky *yel.* ndl. — D.s. c. alc.
1460	183–4	**Benzoyl-p-chloranilide,** $Ph.CO.NH.C_6H_4Cl$. — 6-sided tbl. fr. alc.
1465	d. 184 (gas evol.)	**Quinoxaline Hydrochloride,** $C_8H_6N_2.HCl$. — ⟨**⟩ — Sm. ndl. — Softens @ 170°. — Corresp. B̄: v.s. c. aq.; m.p. 27°; No. **2**.536.
1470	185	**2-Chlor-3-aminobenzoic Ac,** $Cl(NH_2).C_6H_3.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 171.5. — 6-sided tbl. or pr. — Heated some time above m.p. gives indigo blue mass!
1475	185–6	**3-Chlor-4-nitrobenzoic Ac.,** $Cl(NO_2).C_6H_3.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 201.5. — Sbl. in sm. ndl. — E.s. h. aq., alc., eth., chlf. — $Ba\bar{A}_2.2Aq$: ndl.; e.s. aq.
1480	186	**Dichlorisatine,** $Cl_2.C_8H_3NO_2$. — Lust. *red* cryst.! — S. in 30 pt. alc. of sp. gr. 0.83; s. c. KOH sol. w. deep red color, becoming pale yel. on heating. — Distn. w. KOH gives dichloraniline.
1485	186.5; 184	**Acet-4-chlor-α-naphthalide,** $C_2H_3O.NH.C_{10}H_6Cl$. — Ndl. — E.s. alc., eth.
1490	186	**3,5-Dichlor-o-acettoluide,** $Cl_2.C_6H_2Me.COMe$. — Cryst. fr. alc. — E.s. alc., gl. ac. ac.
1495	186–7	**3,5-Dichloracetanilide,** $Cl_2.C_6H_3.NH.COMe$.
1500	184–5; 190	**2,4,5-Trichloracetanilide,** $Cl_3.C_6H_2.COMe$. — Ndl. — D.s. bz.; less s. 50% ac. ac.
1505	187	**1,3,5-Trichlor-2,4,6-trinitrobenzene,** $Cl_3.C_6.(NO_2)_3$. — ⟨*⟩ — Ndl. fr. alc. — E.s. eth., chlf., bz., CS_2.
1510	188	**2,4,6,2',4',6'-Hexachlorazobenzene,** $(Cl_3.C_6H_2-)_2N_2$. — *Dark red* ndl. fr. alc. + chlf.! — I. alc.; e.s. chlf. — Red. by Sn + HCl to trichloraniline, No. **50**.475.
1515	188	**2,6-Dichlor-4-nitroaniline,** $Cl_2.(NO_2).C_6H_2.NH_2$. — Short *lemon-yel.* ndl.
1520	188–9	**Hexamethylenetetramine Hydrochloride,** $C_6H_{12}N_4.HCl$ (@ 100°). — ⟨**⟩ — Ndl. — V.s. aq.; d.s. alc. — Corresp. B̄: v.s. c. aq.; No. **2**.1051.
1525	192	**Aniline Hydrochloride,** $Ph.NH_2.HCl$. — ⟨**⟩ — Ndl. or lft. — V.s. aq., alc. — Corresp. B̄: b.p. 184°; s. in 32 pt. c. aq.; No. **2**.1235.
1530	192–3	**3-Chlorcarbazole,** $Cl.C_{12}H_8N$. — Silvery lft. fr. chlf. — D.s. alc.; v.d.s. lgr.
1532	198–200	**2,6-Dichlortrinitronaphthalene,** $Cl_2.C_{10}H_3.(NO_2)_3$. — *Light yel.* flat ndl.
1535	199–200	**2-Chlor-5,x-dinitrobenzoic Ac.,** $Cl(NO_2)_2.C_6H_2.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 246.5. — V.d.s. aq.; e.s. alc.; alm. i. bz. — (D.R.P. 106,510.)
1536	200–1	**2,7-Dichlortrinitronaphthalene,** $Cl_2.C_{10}H_3.(NO_2)_3$. — *Pale yel.* flat ndl.
1537	201–2	**1^2-Chlor-2-nitrocinnamic Ac.,** $NO_2.C_6H_4.CH : CCl.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 227.5. — Ndl. fr. h. aq. — E.s. alc.
1540	202–3	**Dichlorcarbazole,** $Cl_2.C_{12}H_7N$. — Warts fr. alc.
1545	202–5	**Pyridinebetaine Hydrochloride,** $\ulcorner NC_5H_5.CH_2.O.CO \urcorner .HCl$. — ⟨*⟩ — Glassy tbl. — V.s. aq.; less s. alc.; i. eth. — Softens @ 190°. — Dec. in melting to CO_2, MeCl & pyridine. — Aq. sol. becomes blue w. Na amalgam! — (The betaine cryst. w. 1 aq. in effloresc. tbl.)
1550	203–5 r. h.	**2,6-Dichlordiaminobenzaldehyde,** $Cl_2(NH_2).C_6H_2.CHO$. — *Pale yel.* ndl. — Conc. HCl turns orange & dis. w. yel. color! — E.s. alc., eth., bz.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND CHLORINE. — SOLIDS.
1555	204–5	**2,3,5-Trichlorbenzamide, $Cl_3.C_6H_5.CONH_2$.** — Ndl. fr. dil. ac. ac.
1560	204	**2,4,6-Trichloracetanilide, $Cl_3.C_6H_2.NH.CO.Me$.** — Ndl. — S. alc., 50% ac. ac.; v.d.s. eth
1562	205–7	**1^2-Chlor-3-nitrocinnamic Ac., $NO_2.C_6H_4.CH : CCl.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 227.5. — Ndl. fr. h. aq.
1565	208–10	d-Coniine Hydrochloride, $C_8H_{17}N.HCl$. — ⟨**⟩ — Cryst. — S. in 2 pt. aq.; v.s. alc. — Corresp. $\bar{B}$: b.p. 166–7°c.; No. **2**.1214.
1570	210	**α-Pipecoline Hydrochloride, β-i-Methylpiperidine Hydrochloride, ⌜CHMe.-$(CH_2)_4.NH$⌝HCl.** — ⟨**⟩ — E. sol. ndl. — (Corresp. base: b.p. 116.5 (th.i.) (715); No. **2**.1134.)
1575	210	**Trichloraminobenzoic Ac., $Cl_3.(NH_2).C_6H\ CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 240.5. — Ndl. fr. h. aq. — (Forms salts w. bases only.) — $Ba\bar{A}_2.3H_2O$: cryst.; mod. s. h. aq.
1580	212	**4-Chlor-3-aminobenzoic Ac., $Cl(NH_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 171.5. — Ndl. — Mod. s. h. aq , d.s. c. — $Cu\bar{A}_2$: green cryst.; d.s. aq. — $\bar{B}.H_2SO_4$: sm. ndl.; d.s. c. aq.
1585	212	**6-Chlor-3-aminobenzoic Ac.,** $Cl(NH_2).C_6H_3.CO_2H$. — ⟨G.O.-E.⟩ — Ndl. — E.s. aq., alc. — $\bar{B}.H_2SO_4$: ndl.; d.s. c. aq.
1590	214.5	**2-Chlor-4-aminobenzoic Ac., $Cl(NH_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩.
1595	214	**Acet-2,4-dichlor-α-naphthalide, $C_2H_3O.NH.C_{10}H_5Cl_2$.** — Sbl. in wooly ndl. — V.d.s. c. alc., chlf., gl. ac. ac.
1600	214.5–15	**o-Toluidine Hydrochloride, $Me.C_6H_4.NH_2.HCl$.** — ⟨**⟩ — B.p. 242°. — Cryst. w. $1H_2O$. 100 pt. c. aq. then dis. 37 pt. — Corresp. $\bar{B}$: d.s. c. aq.; b.p. 200°c.; No. **2**.1262.
1605	216	**5-Chlor-3-aminobenzoic Ac., $Cl(NH_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — Ndl. — D.s. aq.; e.s. alc., eth. — $Ag\bar{A}$: ppt.; ndl. fr. much h. aq
1610	217	**ω-Phenylethylamine Hydrochloride, $PhCH_2.CH_2.NH_2.HCl$.** — ⟨**⟩ — **Lft.** fr. abs. alc. — 100 pt. aq. @ 14° dis. 79.5 pt.
1615	218	**Tetrachlor-p-phenylenediamine, $Cl_4(NH_2)_2.C_6$.** — *Reddish* ndl. fr. dil. alc. — Alm. i. aq. or c. HCl, sp. gr. 1.2; e.s. alc., eth., bz. — Oxid. to chloranil, No. **3**.2190, by HNO_3.
1617	219–20; 224	**1^2-Chlor-4-nitrocinnamic Ac., $NO_2.C_6H_4.CH : CCl.CO_2H$.** — ⟨G.O.-E.⟩ — Pr. fr. alc. — l. c. aq.; s. h. alc.
1620	220	**2,4,5-Trichlor-x-nitrobenzoic Ac., $Cl_3(NO_2).C_6H.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 270.5. — Ndl. fr. aq. — V.d.s. h. aq. — $Ba\bar{A}_2.2H_2O$: cryst. powd.; d.s. c., e.s. h. aq.
1625	220–1d.	**Papaverine Hydrochloride, $C_{20}H_{21}NO_4.HCl$.** — ⟨**⟩ — Cryst. — S. @ 18° in 37.3 pt. aq. — Melts w. gas evol. — Corresp. $\bar{B}$: m.p. 146–7 u.c.; No. **2**.885; alm. i. h. aq.
1630	225d.	**Hexachlorcarbazole, $Cl_6.C_{12}H_3N$.** — Long *yel.* ndl. fr. bz. — D.s. alc.; e.s. bz. — (" Not at. by alc.-KOH.") — D.s. oil of vit. w. yel.-green color.
1635	225; 227	**3,4,6-Trichlor-2,5-dinitrotoluene, $Cl_3.C_6.Me,(NO_2)_2$.** — Ndl. — D.s. alc.; e.s. bz. — W. alc.-NH_3 @ 100° gives trichlornitrotoluidine: m.p. 191°.
1640	226	**Methylamine Hydrochloride, $MeNH_2.HCl$.** — ⟨**⟩ — Deliq. lft. — Corresp. $\bar{B}$: b.p. −6.7°; v.s. aq.; No. **2**.1059.
1645	227–8d.	**Betaine Hydrochloride, " Acidol " (commercial), $C_5H_{11}NO_2.HCl$.** — ⟨**⟩ — Monoclin. tbl. — E.s. aq.; i. abs. alc. — Corresp. $\bar{B}$: d. 273° ± 3° u. c.; No. **2** 2619.
1650	227–8	**Tribenzylamine Hydrochloride, $(PhCH_2)_3N.HCl$.** — ⟨**⟩ — B.p. 380–90°. — Hexag. cryst. — I. c. aq.; e.s. h. alc. — (" Not decd. by aq.") — Corresp. $\bar{B}$: scales; i. aq.; m.p. 92°; No. **2**.722.
1655	228	**m-Toluidine Hydrochloride, $Me.C_6H_4.NH_2.HCl$.** — ⟨**⟩ — B.p. 249.8 (760). — 100 pt. aq. @ 12° dis. 96.3 pt. — 100 pt. alc. (94%) @ 9° dis. 61.9 pt. — Corresp. $\bar{B}$: alm. i. aq.; b.p. 203° c.; No **2**.1265.
1660	232	**Pentachloraniline, $Cl_5.C_6.NH_2$.** — Long ndl. fr. alc. — E.s. alc., eth.; less s. lgr.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND CHLORINE. — SOLIDS.
1665	235	**3-Chlor-2-nitrobenzoic Ac.,** $Cl(NO_2).C_6H_3.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 201.5. — Thin ndl. or 6-sided tbl. — V.d.s. h. aq.; e.s. eth. — $Ba\bar{A}_2.4Aq.$: silvery lft.; e.s. aq. — Anilide: tbl. fr. alc.; m.p. 186°.
1670	237	**Piperidine Hydrochloride,** $C_5H_{11}N.HCl$. — ⟨**⟩ — Cryst. — V.s. aq. — Corresp. $\bar{B}$: misc. aq.; b.p. 106° c.; No. **2**.1112.
1675	238–9; 243	**p-Toluidine Hydrochloride,** $Me.C_6H_4.NH_2.HCl$. — ⟨**⟩ — B.p. 257°. — Ndl. fr. gl. ac. ac. + eth. — 100 pt. aq. @ 11° dis. 22.9 pt. — 100 pt. alc. (89%) @ 17° dis. 25 pt. — Corresp. $\bar{B}$: alm. i. aq.; m.p. 42.9°; No. **2**.566.
1680	240; 243–6 (browning)	**Phenylhydrazine Hydrochloride,** $Ph.NH.NH_2.HCl$. — ⟨**⟩ — Silky lft. — E. s. aq., alc.; i. eth. — Corresp. $\bar{B}$: b.p. 243.5° (th.i.) sl. d.; No. **2**.1369.
1685	241–2; 238 (unc.)	**α-Triphenylguanidine Hydrochloride,** $PhN:C.(NHPh)_2.HCl + H_2O$. — ⟨**⟩ — Scales. — Anhydrous salt s. in 51 pt. aq. @ 0°. — Corresp. $\bar{B}$: alm. i. aq.; m.p. 145° c.; No. **2**.882.
1690	243d.	**m-Chlorisatine,** $Cl.C_8H_4NO_2$. — *Or.-yel.* pr. — Gives skin unpleasant odor. — S. in 1000 pt. aq. @ 0°, or in over 200 pt. @ 14°. — S. in KOH w. deep red color. — Distn. w. KOH gives chloraniline.
1692	245–6	**2,7-Dichlor-dinitro-naphthalene,** $C_{10}H_6Cl_2$. — *Light yel.* pr. becoming green in light.
1693	246	**1,5-Dichlor-nitro-naphthalene,** $C_{10}H_6Cl_2$. — *Light yel.* ndl. — V.d.s. even in gl. ac. ac. — PCl_5 gives ϵ-tetrachlornaphthalene: ndl.; d.s. aq.; m.p. 180°.
1694	252–3	**2,6-Dichlordinitronaphthalene,** $Cl_2.C_{10}H_4.(NO_2)_2$. — *Pale yel.* ndl. — Reddens in light. — PCl_5 gives tetrachlornaphthalene. — (Attacked by alc.-KOH.)
1695	248 (r.h.); 246–50(sl.h.); 255.5–8	**Benzylamine Hydrochloride,** $PhCH_2.NH_2.HCl$. — ⟨**⟩ — Tbl. — E.s. aq., alc. — Corresp. $\bar{B}$: s. aq.; b.p. 184° c.; No. **2**.1236.
1700	256	**Dibenzylamine Hydrochloride,** $(PhCH_2)_2NH.HCl$. — ⟨**⟩ — Lft. — E.s. h. aq., alc. — Corresp. $\bar{B}$: i. aq.; b.p. 309° ± 6°; No. **2**.1448.
1705	265–8d.	**Chloranthranilcarbonic Ac.,** $\ulcorner C_6H_3Cl.N(CO_2H).CO \urcorner$. — ⟨T. **4**.3⟩ — Pearly lft. fr. alc. + acetone. — I. aq., eth., bz.; d.s. alc., acetone. — Boiled w. conc. HCl gives CO_2 & Chlor-2-aminobenzoic Ac. — (Fr. oxidn. of chlorisatine.)
1710	267	**Auramine Hydrochloride,** $(C_6H_4.NMe_2)_2:C:NH.HCl + H_2O$. — ⟨**⟩ — *Yel.* lft. — D.s. c. aq.; more s. alc. — Dyes tannin mordanted cotton, pure yellow. — Corresp. $\bar{B}$: No. **2**.3252
1715	275.5–6d.	**Dekahydroquinoline Hydrochloride,** $C_9H_{17}N.HCl$. — ⟨**⟩ — E.s. alc., aq. — Corresp. $\bar{B}$: m.p. 48.2–8.5°; e.s. warm aq.; red. am.-Ag sol.; No. **2**.585.
1720	271–5d.	**Trimethylamine Hydrochloride,** $Me_3N.HCl$. — ⟨**⟩ — Dec. @ 185° to MeCl & Me_3N & $MeNH_2$. — Corresp. $\bar{B}$: No. **2**.1060.
1725	280–1; 274	**9-Methyl-8-oxy-2,6-Dichlorpurine,** $C_4H_4ON_4Cl_2$. — Ndl. fr. alc. — Vol. without decn. — E.s. alk — "Not decd. by boiling alk."
1730	285–90	**3,6-Dichlordianilinobenzoquinone, Chloranilanilide,** $(NHPh)_2.C_6Cl_2O_2$. — (Fr. boiling chloranil w. alc. & aniline.) — *Yel.-brown* tbl. w. met. lust. fr. bz. — Sbl. alm. undecd. — I. aq.; alm. i. h. alc.; s. conc. H_2SO_4 w. blue violet color! — Boiled w. alc.-KOH gives off aniline.

ANALYTICAL TABLES

OF

ORDER L

COMPOUNDS CONTAINING NITROGEN AND CHLORINE AS "ADDITIONAL ELEMENTS"

DIVISION B, LIQUID SPECIES.

No.	Boiling-point (C.°)	Specific Gravity	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
1795	12.7; 15.5		**Cyanogen Chloride, $CN.Cl$.** — Solid @ 5° to 6°. — 1 vol. aq. dis. 50 vol. (Sol. not pptd. by $AgNO_3$). — Dis. in KOH sol. to give KCNO & KCl. — On long keeping changes partially to cyanuric chloride, No. **50**.1185.
1800	46	.989 (0)	**Dimethylchloramine, Me_2NCl.** — Odor pungent.
1805	59–60		**Methyldichloramine, $MeNCl_2$.** — Yel. liq. — Vapor v. irritating to eyes! — Not decd. by h. aq.
1807	83–4	1.439 (12°)	**Trichloracetonitrile, $CCl_3.CN$.** — HBr gas polymerizes in 1½ days to comp.: pr. fr. alc.; i.c. aq.; m.p. 96°.
1810	88–9	1.230 (15)	**Ethyldichloramine, $EtNCl_2$.** — Odor highly irritating! — I. aq., acids. — Unstable on keeping. — Alk. gives ac. ac. & NH_3.
1815	92–3d.		**Ethylcarbamyl Chloride, $Et.NH.COCl$.** — Odor pungent. — Powerful lachrymator! — Aq. dec. to CO_2 & $Et.NH_2.HCl$. / — W. aniline gives ethylphenylurea, No. **2**.1861. /
1817	105	1.431 (15°)	**α,α-Dichlorpropionitrile, $Me.CCl_2.CN$.** — I. aq.; misc. alc., eth. — Satd. w. HCl gas changes to polymer: tbl.; i. alc., chlf.; d.w.m. abt. 130°.
1825	112c.	1.6922 (0/4) 1.6539 (20/4)	**Chlorpicrin, Trichlornitromethane, $C.Cl_3(NO_2)$.** — Vapors powerfully lachrymatory! — M.p. −69.2° c. — Alm. i. aq.; 1 vol. 80.5% alc. dis. 3.7 vol. — Reductn. w. Fe & ac. ac. gives methylamine, No. **2**.1059.
1827	112–3	1.374 (11.4°)	**Dichloracetonitrile, $CHCl_2.CN$.** — Absorbs dry HCl giving unstable cryst. comp. of m.p. 140–5°.
1835	122–3	1.466 (15)	**Chlornitromethane, $CH_2Cl(NO_2)$.** — Odor "somewhat" irritating. — S. 20 pt. aq.; e.s. NaOH sol.
1837	123–4	1.204 (11°)	**Chloracetonitrile, $CH_2Cl.CN$.** — Odor, pungent.
1840	124–5	1.247 (7.5)	**1-Chlor-1-nitroethane, $Me.CHCl(NO_2)$.** — I. aq.; s. alk.
1850	148 (743.5)		**3-(β-)Chlorpyridine, C_5H_4ClN.** — Refract. liq. of penetrating odor. — Sl. s. aq. — V. stable. — Unchanged by boiling w. conc. min. ac. — $\bar{B}_2.PtCl_6.2H_2O$: or.-red ndl.; m.p. abt. 168°. — Picrate: yel. ndl.; m.p. abt. 135°.
1855	147–8		**4-(γ-)Chlorpyridine, C_5H_4ClN.** — Liq. — Dec. on keeping. — Mod. s. aq. — $\bar{B}_2.PtCl_6.H_2O$: cryst.; m.p. 202°.
1870	162.5–3c.		**4-Chlor-2-methylpyridine, $Cl.C_5H_3N.Me$.** — Liq. — $\bar{B}_2.H_2PtCl_6$: yel. cryst.

No.	Boiling-point (C.°)	Specific Gravity	“ADDITIONAL ELEMENTS” — NITROGEN AND CHLORINE. — LIQUIDS.
1872	165		**Dimethylcarbamyl Chloride, $NMe_2.COCl$.** — Fairly stable w. c. aq. or alk.
1875	166	1.205 (15)	**2-(α-)Chlorpyridine, C_5H_4ClN.** — Oil. — B̄.$HgCl_2$: pr. fr. alc.; d.s. aq.
1880	173–4	1.405 (7)	**2-Chlor-1-nitroethane, $ClCH_2.CH_2.NO_2$.** — Taste sharp. — I. aq. — HCl gives hydroxylamine & chloracetic ac.
1890	178	1.105 (17)	**4-Chlor-2,6-dimethylpyridine, $Cl,Me_2.C_5H_2N$.** — Little s. aq.
1895	180–90d.	1.459 (15)	**s-Dichlorisopropyl Nitrate, Mononitrodichlorhydrine, $ClCH_2.$-$CH(NO_3).CH_2Cl$.** — (D.R.P. 197404.)
1897	186		**Diethylcarbamyl Chloride, $NEt_2.COCl$.**
1900	190		**Ethyl Chlorcyanoacetate, $CH(CN)Cl.CO_2Et$.** — Irritating odor like chlorpicrin.
1905	190–5		**2-Chlor-4-methylpyridine, $Cl,Me.C_5H_3N$.**
1910	206–7		**2-Chlordimethylaniline, $Cl.C_6H_4.NMe_2$.** — Liq. — B̄$_2$.H_2PtCl_6: lust. yel. pr.
1915	207 (th.i.)	1.2125 (20/4)	**o-Chloraniline, $Cl.C_6H_4.NH_2$.** — ⟨**⟩ — St. liq. @ −14°. — B̄.HCl: rhomb. tbl.; 10.2 pt. dis. in 100 pt. aq. @ 13.5°. — (Apparently stable to boiling NaOH sol.)
1920	212–4		**6-Chlor-2,4-dimethylpyridine, $Cl,Me_2.C_5H_2N$.** — Liq.
1925	215–6c.; 214	1.1735 (11.5)	**α-Chlormethylaniline, $Cl.C_6H_4.NHMe$.** — Oil.
1930	218–9 (732)	1.151 (20)	**3-Chlor-p-toluidine, $Cl.C_6H_3Me.NH_2$, (NH_2 = 4).** — B̄.HNO_3: 100 pt. aq. @ 19° dis. 2.593 pt.
1935	228–9		**2-Chlor-m-toluidine, $Cl.C_6H_3Me.NH_2$, (NH_2 = 3).**
1940	230 (th.i.), (767); 236 (th.i.)	1.222 (15/15)	**m-Chloraniline, $Cl.C_6H_4.NH_2$.** — ⟨**⟩ — Salts only partly decd. by boiling w. aq.
1945	231–3; 234		**3-Chlor-dimethylaniline, $Cl.C_6H_4.NMe_2$.** — (D.R.P. 90771.)
1950	234.5–5.5	1.174 (11.5)	**3-Chlormethylaniline, $Cl.C_6H_4.NHMe$.**
1955	239–40	1.169 (11.5)	**4-Chlormethylaniline, $Cl.C_6H_4.NHMe$.** — Oil.
1960	242 (730)		**5-Chlor-m-toluidine, $Cl.C_6H_3Me.NH$.** — B̄.HCl: ndl.; m.p. 198° d.
1965	245		**6-Chlor-o-toluidine, $Cl.C_6H_3.Me.NH_2$.**
1970	248–9 (740)		**3-Chlordiethylaniline, $Cl.C_6H_4.NEt_2$.** — Oil. — (Pat.)
1975	255 (743)		**Py-3-Chlorquinoline, $Cl.C_9H_6N$.** — Vol. w. st. — V. hygroscopic. — B̄.HCl: broad ndl. fr. alc.; m.p. 210° (frothing); sbl. — B̄$_2$.$H_2PtCl_6.2H_2O$: ndl.; m.p. a. 300°.
1977	260		**o-Cyanbenzal Chloride, $CN.C_6H_4.CHCl_2$.** — Split by conc. HCl at 170° to HCl, NH_3 & o-phthalaldehydic ac.
1980	260 (th.i.) (745)	1.297 (22)	**4-Chlor-3-nitrotoluene, $Cl(NO_2).C_6H_3Me$.** — M.p. 7°.
1985	263		**2-Chlor-3-nitrotoluene, $Cl(NO_2).C_6H_3Me$.**
1990	272–5d.		**m-Cyanbenzal Chloride, $CN.C_6H_4.CH_2Cl$.**
1992	273–6 (770 mm.)		**p-Cyanbenzal Chloride, $CHCl_2.C_6H_4.CN$.**
1995	288		**8-(Bz-1)Chlorquinoline, $Cl.C_9H_6N$.** — Yel. oil — St. liq. @ − 20. — B̄$_2$.H_2PtCl_6: m.p. 235° d. — B̄.MeI: yel. cryst; m.p. 248° d.

CHAPTER VIII

ORDER LI

COMPOUNDS CONTAINING NITROGEN AND BROMINE AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

Division A of Order LI contains all species solid at room-temperature. *Division B* contains all species liquid at room-temperature. Neither division is subdivided into sections.

Read the lettered " General Observations " on the species of Order L at the beginning of Chapter VII. The remarks made in that place on the *chlorine* compounds of Order L are equally applicable as suggestions in the identification of the corresponding *bromine* compounds of Order LI. All references to "General Observations" enclosed in pointed parentheses in the "Analytical Tables" of Order LI are accordingly intended to direct attention to the correspondingly lettered paragraphs of Order L (page 122 of this volume).

ANALYTICAL TABLES

OF

ORDER LI

COMPOUNDS CONTAINING NITROGEN AND BROMINE AS "ADDITIONAL ELEMENTS"

DIVISION A, SOLID SPECIES

No.	Melting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	10.2	**Brompicrin, Tribromnitromethane, $CBr_3(NO_2)$.** — ⟨*⟩ — B.p. 127° (118 mm.) — Sp. gr. = 2.811 (12.5°). — Pr. — Powerful, irritating odor!
55	18–18.5	**m-Bromaniline, $Br.C_6H_4.NH_2$.** — ⟨**⟩ — B.p. 251°.
60	24; 18–9	**6-(p-Bz-3)-Bromquinoline, $Br.C_9H_6N$.** – B.p. 278°. — V. stable. — $\bar{B}.HCl.H_2O$: ndl.; m.p. 213° d. — $\bar{B}$.Pk: ppt. of yel. ndl.; m.p. 216–17°.
65	26	**3-Brom-4-toluidine, $Br.C_6H_3.Me(NH_2)$.** — B.p. 240°. — Lft. — $\bar{B}.HNO_3$: lft.; m.p. 182°; 100 pt. aq. dis. 2.53 pt. @ 19°. — (Fr. bromination of p-acettoluide).
70	25–6	**2-Brom-4-toluidine, $Br.C_6H_3.Me,(NH_2)$.** — B.p. 254–7°. — Bromination gives tribrom-p-toluidine: m.p. 83°.
75	29–30	**4-Bromquinoline, $Br.C_9H_6N$.** — B.p. 270° d. — Cryst. mass. — $\bar{B}$.MeI: yel. cryst. fr. aq.; m.p. 265–70°.
80	31–2; 28; 33–4	**4-Brom-3-nitrotoluene, $Br,NO_2.C_6H_3.Me$.** — ⟨*⟩ — B.p. 255–6°.
85	30–1	**o-Bromaniline, $Br.C_6H_4.NH_2$.** — ⟨**⟩ — B.p. 250–1° undecd. — Cryst.
90	33–5	**2,6-Dibrom-3-toluidine, $Br_2.C_6H_4.Me(NH_2)$.** — ⟨**⟩.
95	35; 32	**4-Brom-m-toluidine, $Br.C_6H_3Me.NH_2$, (Me = 1).** — Pr.
100	35–6	**5-Brom-m-toluidine, $Br.C_6H_3Me.NH_2$.** — B.p. 255–60°. — Solidif. slowly.
105	41; 43	**o-Bromnitrobenzene, $Br.C_6H_4.NO_2$.** — ⟨*⟩ — B.p. 261° (th.i.). — Faintly yellowish pointed cryst. fr. alc. — Immediately sol. in 1 vol. fuming H_2SO_4, unlike para-isomer. — Heated w. KOH in sealed tube gives o-nitrophenol, No. **2**.2890.
110	44	**5-Brom-2-nitrophenol, $Br.C_6H_3(NO_2)(OH)$.** — ⟨**⟩ — *Yel.* ndl. fr. lgr. — E. vol. w. st. — Na$\bar{A}$: e.s.; dark red ndl.
115	45.5	**4-Brom-2-nitrotoluene, $Br,NO_2.C_6H_3.Me$.** — ⟨*⟩ — B.p. 256–7°. — *Yellowish* ndl. fr. dil. alc.
120	46	**$1^1,1^1$-Dibrom-2-nitrotoluene, $CHBr_2.C_6H_4.NO_2$.** — ⟨*⟩ — Pr. fr. alc. — Boiled w. Na_2CO_3 sol. gives o-nitrobenzaldehyde.
125	47–50	**α,α-Dibromethylamine, $Me.CBr_2.NH_2$.** — ⟨*⟩ — Cryst. — Sbl. — Decd. by aq. to ac. ac., NH_4Br & HBr.
130	48–9	**Py-2-Bromquinoline, $Br.C_9H_6N$.** — Fine lust. ndl. fr. alc. — V. s. eth., chlf., bz. — Boiled w. dil. acids dec. to HBr & carbostyril, No. **2**.2450.
135	49–50; 50–1	**5-Brom-2-amino-1,3-xylene, $Br.C_6H_2.Me_2,NH_2$.** — Ndl. fr. alc.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND BROMINE. — SOLIDS.
140	50	**3,5-Dibrom-o-toluidine, $Br_2.C_6H_2.Me,NH_2$.** — Ndl. — Forms salts w. conc. min. acids only. — $\bar{B}_2.H_2PtCl_6.1\frac{1}{2}H_2O$: yel. ndl.; d.s. aq.
145	51–2	**2,5-Dibromaniline, $Br_2.C_6H_3.NH_2$.** — ⟨**⟩.
149	52	**Cyanogen Bromide, $CN.Br$.** — ⟨*⟩ — B.p. 61.3° (750 mm.) — Odor powerful, irritating! — Cryst. — W. alc. gives urethane, NH_4Br,CO_2, etc.
150	52	**5-(Bz-4)-Bromquinoline, $Br.C_9H_6N$.** — B.p. 280°. — Ndl. — Vol. w. st. — $\bar{B}.MeI$: m.p. 205°.
155	55	**p-Bromdimethylaniline, $Br.C_6H_4.NMe_2$.** — B.p. 264° c. — Lft. — Heated alone in tube at 180° gives blue-violet & red dyestuffs.
160	55–6	**1^2-Brom-o-nitroacetophenone, $Br.C_6H_4.CO.CH_2Br$.** — ⟨*⟩ — Ndl. fr. lgr. — A lachrymator!
165	56.4	**m-Bromnitrobenzene, $Br.C_6H_4.NO_2$.** — ⟨*⟩ — B.p. 256.5 (th.i.). — Little s. aq.; e.s. alc. — Scarcely attacked by alc.-KOH.
170	56.5	**3,5-Dibromaniline, $Br_2.C_6H_3.NH_2$.** — ⟨**⟩ — Ndl.
175	57–8	**1^1-Brom-3-nitrotoluene, $CH_2Br.C_6H_4.NO_2$.** — ⟨*⟩ — Cryst.
180	57–8	**2,6-Dibrom-4-nitrotoluene, $Br_2.C_6H_2.Me,NO_2$.** — Ndl. — E.s. eth., CS_2, h. alc.
182	57	**4-Brom-2-aminophenyl Ethyl Ether, (Bromphenetidine), $Br.C_6H_3.(NH_2)(OEt)$.** — Ndl. fr. alc. — E.s. alc., eth., bz. — Acetyl deriv.: (fr. ac. anhydr.); lft. v.d.s. aq.; m.p. 177–9°.
185	58	**3,4-Dibromnitrobenzene, $Br_2.C_6H_3.NO_2$.** — ⟨*⟩ — B.p. 296° c. — Cryst. — Vol. w. st. — E.s. alc. — Alc.-NH_3 gives 2-brom-4-nitroaniline.
190	58–9	**4,5-Dibrom-3-toluidine, $Br_2.C_6H_2.Me(NH_2)$.** — ⟨**⟩ — Ndl.
195	59	**1^2,1^2-Dibrom-3-nitroacetophenone, $NO_2.C_6H_4.CO.CHBr_2$.** — ⟨*⟩ — Yellowish ndl. — E.s. alc., eth., bz.
200	59.5; 58	**5-Brom-o-toluidine, $Br.C_6H_3.Me,NH_2$.** — B.p. 240°. — Cryst. fr. alc. — $\bar{B}.HNO_3$: ndl.; m.p. 183°; 100 pt. aq. @ 17° dis. 4.92 pt. — (Fr. bromination of o-toluidine.)
205	59.4	**4-Brom-1,2-dinitrobenzene, $Br.C_6H_3.(NO_2)_2$.** — ⟨*⟩ — Pr. fr. alc. — Boiled w. NaOH sol. (sp. gr. 1.135) gives 5,2- and some 4,2-nitrophenol.
210	60	**p-Bromphenylnitromethane, $Br.C_6H_4.CH_2.NO_2$.** — Lust. cryst. — 100 g. aq. @ 0° dis. 0.008 g. — S. NaOH sol.; i. Na_2CO_3 sol. — (A "pseudo acid".) — HCl ppts. the isomeric "iso comp.", m.p. 89–90°, fr. NaOH sol., while CO_2 ppts. original compound.
215	61.6	**2,4-Dibromnitrobenzene, $Br_2.C_6H_3.NO_2$.** — ⟨*⟩ — Cryst. — D.s. c. alc., e.s. h. — W. alc.-NH_3 gives 3-brom-6-nitroaniline, No. **51**.882.
220	62–3.6	**3,4-Dibrom-5-nitrotoluene, $Br_2.C_6H_2.Me,NO_2$.** — ⟨*⟩ — Lft.
225	63; 66.4	**p-Bromaniline, $Br.C_6H_4.NH_2$.** — ⟨*⟩ — Rhomb. cryst. — I. c. aq.; e.s. alc., eth. — Boils w. decn. — Na in eth. sol. gives azobenzene & aniline, (Ber. **16**, 909).
230	65	**3,5-Dibrom-2-amino-1,4-dimethylbenzene, $Br_2,NH_2.C_6H.Me_2$.** — Ndl. fr. lgr.
235	66–7	**Neuronal, Diethylbromacetamide, $Et_2BrC.CONH_2$.** — ⟨*⟩ — Cryst. powd. — Taste bitter, cooling. — S. in 115 pt. aq.; e.s. alc. — Odor charac. — Sapn. w. h. NaOH sol. gives diethylketone, etc. — Heating w. aq. gives ethylcrotonic ac. amide: m.p. 99°. — 0.2 g. boiled some min. w. 0.1 g. yellow mercuric oxide separates white Hg comp. fr. filtrate on cooling. (Apoth. Ztg. **19**, (1904), 873). — (A hypnotic).
240	67–8	**6-Brom-2-nitrophenol, $Br.C_6H_3(NO_2)(OH)$.** — ⟨**⟩ — *Pale yel.* ndl. fr. dil. alc. — $K\bar{A}.H_2O$: ruby red ndl.; e.s. h. aq. — $Me\bar{A}$: lft.; m.p. 67°.
245	67–8	**1^2-Nitro-1^1-bromstyrene, $Ph.CBr : CH.NO_2$.** — ⟨*⟩ — *Golden* ndl. fr. lgr. — S. alc., alk.
250	67.4	**1^2,1^2-Dibrom-4-nitroacetophenone, $NO_2.C_6H_4.CO.CHBr_2$.** — ⟨*⟩ — Tbl. fr. bz. + lgr. — D.s. c. alc., lgr.; e.s. eth., CS_2, bz.
255	69	**m-Bromazobenzene, $Br.C_6H_4.N_2.Ph$.** — Lust. *Yel.-br.* lft. fr. lgr. — E.s. alc. eth., chlf., bz. — Red by Sn + HCl to aniline & m-bromaniline.

No.	Melting-point (C.°)	**"ADDITIONAL ELEMENTS" — NITROGEN AND BROMINE. — SOLIDS.**
260	69.5–70.2	**2,5-Dibrom-3-nitrotoluene,** $Br_2.C_6H_2.Me,NO_2$. — ⟨*⟩.
265	71	**4,5-Dibrom-1,3-dinitrobenzene,** $Br_2.C_6H_2.(NO_2)_2$. — ⟨*⟩ — Tbl. fr. CS_2. — E.s. alc. — Alc.-NH_3 gives 6-brom-2,4-dinitroaniline, No. **51**.887.
270	71.6; 72	**4-Brom-1,3-dinitrobenzene,** $Br.C_6H_3(NO_2)_2$. — ⟨*⟩ — *Yel.* cryst. — Heated w. KOH sol. gives 2,4-dinitrophenol, No. **2**.3126. — Sn + HCl red. to m-phenylenediamine.
275	72.4–7.1	**2,5-Dibrom-3-toluidine,** $Br_2.C_6H_2.Me(NH_2)$. — ⟨**⟩.
280	74	**4-Bromnitrosomethylaniline,** $Br.C_6H_4.N(NO)Me$. — Ndl. fr. alc.
285	73; 74	**3,5-Dibrom-4-toluidine,** $Br_2.C_6H_2.Me(NH_2)$. — ⟨**⟩ — Ndl. — ("Does not unite w. acids.")
290	74.5–5.5	**4,6-Dibrom-3-toluidine,** $Br_2.C_6H_2.Me,NH_2$. — ⟨**⟩.
295	74	**5-Brom-2-nitrobenzaldehyde,** $Br(NO_2).C_6H_3.CHO$. — Long lust. ndl. fr. dil. alc. — E.s. h. aq., alc. — Vol. w. st. — W. acetone + NaOH sol. gives dibromindigo at once! — (D.R.P. 33064).
300	75	**$3,3^1$-Dibrom-$4,4^1$-azotoluene,** $(Br,Me.C_6H_3)_2N_2$. — *Yel.* cryst. — E.s. eth., chlf., acetone.
302	76	**o-Cyanbenzyl Bromide,** $CH_2Br.C_6H_4.CN$. — ⟨*⟩ — Boils undecd. — Monoclin. pr. — E.s. alc., eth.
305	77.5	**2-Brom-4-nitrotoluene,** $Br,NO_2.C_6H_3.Me$. — ⟨*⟩ — E.s. eth., CS_2.
310	78	**2-Brom-5-nitrotoluene,** $Br,NO_2.C_6H_3.Me$. — ⟨*⟩ — E.s. eth., CS_2, h. alc.
315	78.4–8	**6-Brom-m-toluidine,** $Br,Me.C_6H_3.NH_2$, **(Me = 1).** — ⟨*⟩ — B.p. 240°. — Cryst.
320	79.5	**2,4-Dibromaniline,** $Br_2.C_6H_3.NH_2$. — ⟨**⟩ — Ndl. or lft. — Warmed w. Zn dust + dil. HCl gives p-bromaniline, No. **51**.225, (Ann. **272**, 220).
335	80–1	**3,4-Dibromaniline,** $Br_2.C_6H_3.NH_2$. — ⟨**⟩ — Silvery lft. — Sbl. @ 100°. — B̄.Pk: yel. ndl.; m.p. 149°.
337	80	**N-Brompropionamide,** $Et.CONHBr$. — ⟨*⟩ — Flat ndl. — Warmed w. NaOH sol. gives ethylamine, No. **2**.1062.
340	81.4–1.8	**3,5-Bromnitrotoluene,** $Br,NO_2.C_6H_3.Me$. — ⟨*⟩ — B.p. 269–70°. — Pr.
345	81; (119.5)	**2,3,5-Tribromnitrobenzene,** $Br_3.C_6H_2.NO_2$. — ⟨*⟩ — Ndl. — Vol. w. st. — (W. alc.-NH_3 @ 140° gives dibrom-o-nitraniline). — Reductn. gives 2,3,5-tribromaniline, No. **51**.465.
350	82	**$2,2^1$-Dibromhydrazobenzene,** $(Br.C_6H_4)_2N_2H_2$.
355	82–2.5	**$1^1,1^1$-Dibrom-4-nitrotoluene,** $NO_2.C_6H_4.CHBr_2$. — ⟨*⟩ — Cryst. fr. alc. — E.s. alc., eth. — Heated w. aniline gives p-rosaniline.
360	82.5–3	**2,3,5-Tribrom-4-toluidine,** $Br_3.C_6H.Me(NH_2)$. — Ndl.
365	83.5; 85.4	**2,5-Dibromnitrobenzene,** $Br_2.C_6H_3.NO_2$. — ⟨*⟩ — Tbl. fr. acetone. — Alc.-NH_3 @ 200–10° gives 4-brom-2-nitroaniline, No. **51**.622.
370	83–4	**2,6-Dibromaniline,** $Br_2.C_6H_3.NH_2$. — ⟨**⟩ — B.p. 262–4°. — Ndl. — E.s. abs. alc., eth., chlf., bz. — B̄.HCl: m.p. 126°; loses HCl easily.
375	80; 85–6	**2,4,5-Tribromaniline,** $Br_3.C_6H_2.NH_2$. — ⟨**⟩ — Ndl. fr. alc. — V.s. alc., eth., bz. — B̄.HCl: ndl. fr. alc.
380	83	**α-Bromisobutyranilide,** $Me_2CBr.CO.NHPh$. — Pr. fr. dil. alc. — E.s. bz.
385	84; 82.6	**2,6-Dibromnitrobenzene,** $Br_2.C_6H_3.NO_2$. — ⟨*⟩ — Cryst. — Sbl. — Vol. w. st. — W. alc.-ammonia @ 180° gives nitrophenylenediamine.
390	84.5–5; 83	**2,5-Dibrom-4-toluidine,** $Br_2.C_6H_2.Me(NH_2)$. — Cryst.
395	86.4; 83.5	**5,6-Dibrom-3-toluidine,** $Br_2.C_6H_2.Me,(NH_2)$.
400	85–6	**$1^2,1^2$-Dibrom-2-nitroacetophenone,** $NO_2.C_6H_4.CO.CHBr_2$. — ⟨*⟩ — Pr. fr. lgr. — Powerfully lachrymatory!
402	85	**1,4-Bromnitronaphthalene,** $Br.C_{10}H_6.NO_2$. — *Yel.* ndl. — W. PBr_5 gives 1,4-dibromnaphthalene, No. **4**.775.
405	abt. 85	**o-Brombenzeneazophenol,** $Br.C_6H_4.N_2.C_6H_4OH + \frac{1}{2}H_2O$. — *Yel.* cryst., or

No.	Melting-point (C.°)	“ADDITIONAL ELEMENTS” — NITROGEN AND BROMINE. — SOLIDS.
		red fr. toluene + lgr., w. m.p. 97°. — D.s. lgr.; v.s. acetone. — Benzoate: or. cryst. fr. alc.; m.p. 122–3°.
410	85.6	**4-Brom-2,6-dinitrophenol, $Br(NO_2)_2.C_6H_2(OH)$.** — ⟨**⟩ — *Gold-yel.* ndl. — S. h. aq. — Fuming HNO_3 gives picric ac. — MeĀ: m.p. 67°.
415	86–7	**2,5-Dibrom-4-nitrotoluene, $Br_2.C_6H_2.Me,NO_2$.** — ⟨*⟩ — Ndl.
420	86–7	**4,5-Dibrom-2-nitrotoluene, $Br_2.C_6H_2.Me,NO_2$.** — ⟨*⟩ — Ndl.
425	87	**o-Bromazobenzene, $Br.C_6H_4.N_2.Ph$.** — *Golden* lft. fr. h. alc. — Red. by Sn + HCl to aniline & o-bromaniline.
430	87.5	**m-Bromacetanilide, $Br.C_6H_4.NH(C_2H_3O)$.** — Ndl. fr. dil. alc. — E.s. alc., eth.
435	87–9	**2,6-Dibrom-4-toluidine, $Br_2.C_6H_2.Me(NH_2)$.**
440	88	**4-Brom-2-nitrophenol, $Br(NO_2).C_6H_3OH$.** — ⟨**⟩ — *S-yel.* ndl. fr. alc. — D.s. c. alc.; e.s. eth. — D. vol. w. st. — NaĀ: deep red ndl.
445	88; 89	**p-Bromazobenzene, $Br.C_6H_4.N_2.Ph$.** — Lust. *or.-red* tbl. — Sbl. — D.s. c. alc.; e.s. eth., lgr. — Alc.-$(NH_4)_2S$ red. to hydrazo deriv.: m.p. 115°, No. **51**.785.
447	89.5	**(syn.)-1^2-Bromacetophenoneoxime, $Ph.C(CH_2Br)(NOH)$.** — Cubical cryst. fr. CS_2. — E.s. org. solv. except lgr. — Beckmann’s rearrangement gives bromacetanilide.
450	89–90	**Iso-p-Bromphenylnitromethane, $Br.C_6H_4.CH : NO(OH)$.** — Ndl. fr. bz. + lgr. — Alm. i. c. aq.; e.s. NaOH or Na_2CO_3. — Isomerizes after 12 hrs. keeping to true nitro isomer, m.p. 60°. — $FeCl_3$ colors br.-red.
455	90; 89; 85;	**2,4,6-Tribrom-3-nitrophenol, $Br_3(NO_2).C_6H.OH$.** — ⟨**⟩ — Ndl. — D.s.h. aq.; e.s. alc., eth. — $KĀ.H_2O$: yel.-red warts; e.s. aq. — EtĀ: pr. fr. eth.; m.p. 79°.
460	90	**α-Bromisobutyro-p-toluide, $Me_2.CBr.CO.NH.C_6H_4.Me$.** — Pr. fr. alc. — D.s. lgr.
463	91	**Bromacetamide, $CH_2Br.CO.NH_2$.** — ⟨*⟩ — Ndl. fr. alc. — E.s. aq.; d.s. alc.; i. eth.
465	91	**2,3,5-Tribromaniline, $Br_3.C_6H_2.NH_2$.** — ⟨**⟩ — Ndl. fr. alc.
470	91–2; 89	**p-Bromphenylhydroxylamine, $Br.C_6H_4.NH.OH$.** — Lft. — E.s. alc., eth., bz., h. aq.; alm. i. lgr.
475	91–2	**2,4-Dibromphenylhydrazine, $Br_2.C_6H_3.NH.NH_2$.** — Ndl. fr. lgr. — E.s. eth. — Red. to p-bromaniline, No. **51**.225, by Sn + HCl.
480	91–2	**3,6-Dibrom-2-amino-1,4-dimethylbenzene, $Br_2,NH_2.C_6H.Me_2$.** — Ndl. — V.s. alc.
482	92	**N-Bromisobutyramide, $Me_2CH.CO.NHBr$.** — Ndl.
485	93	**Acetone-p-bromphenylhydrazone, $Br.C_6H_4.N_2H : CMe_2$.** — Lust. lft. fr. lgr.
490	93.5	**2,4,5-Tribromnitrobenzene, $Br_3.C_6H_2.NO_2$.** — ⟨*⟩ — Ndl. fr. alc. — D.s.c. alc.; e.s. eth., CS_2, h. alc. — (W. alc.-NH_3 @ 100–120° gives bromnitro-p-phenylenediamine.)
495	96	**1^1-Brom-3-nitroacetophenone, $NO_2.C_6H_4.CO.CH_2Br$.** — ⟨*⟩ — Ndl. fr. dil. alc. — D.s. eth. — Oxid. by $KMnO_4$ to m-nitrobenzoic ac., No. **2**.139.
500	96	**1,2,3,5-Tetrabromnitrobenzene, $Br_4.C_6H.NO_2$.** — ⟨*⟩ — Cryst. fr. abs. alc. — After fusion & rapid cooling melts @ 60°.
502	96.5–7	**(Anti)-1^2-Bromacetophenoneoxime, $Ph.C(CH_2Br)(NOH)$.** — Cryst.
505	97	**2,5-Dibromphenylhydrazine, $Br_2.C_6H_3.NH.NH_2$.** — Cryst. fr. lgr. — E.s. alc., eth., bz.
507	97–8	**4-Brom-2-aminophenyl Methyl Ether, Bromansidine, $Br.C_6H_3.(OMe)(NH_2)$.** — Pr. fr. bz. — E.s. eth., bz.; h. alc.
510	98	**1^1-Brom-4-nitroacetophenone, $NO_2.C_6H_4.CO.CH_2Br$.** — ⟨*⟩ — Ndl. fr. lgr. + bz. — E.s. alc., eth., CS_2, bz.; i. lgr. — Probably gives p-nitrobenzoic ac., No. **2**.425, on oxidn. w. $KMnO_4$.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND BROMINE. — SOLIDS.
515	98	**Tribrommethyldiphenylamine, $(C_6H_3Br_2)(C_6H_4Br).NMe$.** — Ndl. — E.s. alc., bz.
519	99; 91-2	**4,6-Dibrom-2-aminophenol, $Br_2.C_6H_2.(NH_2)(OH)$.** — Light yel. ndl. fr. dil. alc. — E.s. alc., eth., chlf. bz. — Acetyl deriv. (fr. ac. anhydr.): yellowish ndl. fr. aq.; e.s. alk.; m.p. 186°.
520	99	**o-Bromacetanilide, $Br.C_6H_4.NH(C_2H_3O)$.** — Long ndl. — S. alc.
525	99	**α-Brompropionanilide, Me.CHBr.CO.NHPh.** — Long rods fr. eth. — D.s. lgr.
530	99–100	**1^1-Brom-4-nitrotoluene, $CH_2Br.C_6H_4.NO_2$.** — ⟨*⟩ — Ndl. fr. h. alc. — (Easily at. by Ag Ac.).
535	99–100	**2,5-Dibrom-1,3-dinitrobenzene, $Br_2.C_6H_2.(NO_2)_2$.** — ⟨*⟩ — Ndl. — E.s. alc. — W. alc.-NH_3 @ 100° gives p-bromdinitroaniline, m.p. 160°.
537	99–100	**1,8-Bromnitronaphthalene, $Br.C_{10}H_6.NO_2$.** — *Straw-yel.* ndl. fr. dil. alc.
540	100	**N-Dibromacetamide, $Me.CO.NBr_2$.** — ⟨*⟩ — Yel. ndl. or lft. — Sbl. w. sl. d. — S. (undecd.) warm aq., alc., eth. — W. x.s. KOH gives N, acetate & hypobromite.
543	101-2	**5-Brom-2-nitrophenyllacticacidketone, $Br(NO_2.)C_6H_3.CH(OH).CH_2.CO.Me$.**— Lust. tbl. fr. dil. alc. — D.s. lgr. — W. KOH gives (blue) dibromindigo!
545	100-1.6; 97	**2,4,6-Tribrom-3-toluidine, $Br_3.C_6H.Me(NH_2)$.** — Long ndl. — D.s. alc.
550	101-2	**$1^1,1^1$-Dibrom-3-nitrotoluene, $CHBr_2.C_6H_4.NO_2$.** — ⟨*⟩ — Mic. ndl. fr. alc.
555	101.5	**3-Brom-1,2-dinitrobenzene, $Br.C_6H_3.(NO_2)_2$.** — ⟨*⟩ — B.p. 320°. — Tbl. — E.s. h. alc.
560	102	**4-Brom-α-naphthylamine, $Br.C_{10}H_6.NH_2$.** — Ndl. — Vol. w. st.
562	102; 104	**4-Brom-2-nitro-acetanilide, $Br(NO_2).C_6H_3.NH(CO.Me)$.** — *S-yel.* ndl.
565	103	**4-Brom-3-nitrobenzaldehyde, $Br(NO_2).C_6H_3.CHO$.** — Ndl. fr. alc.
570	103–4	**3,3^1-Dibrombenzidine, $(Br(NH_2).C_6H_3\text{-})_2$.** — Darkens in air. — I. aq.; e.s. alc., bz. — B̈.2HCl: e.s. h. aq.
575	104	**3,4-Dibromphenylhydrazine, $Br_2.C_6H_3.NH.NH_2$.** — Ndl. fr. alc. — D.s. h. aq.; e.s. eth.; less s. alc., lgr. — B̈Pk: red-yel. tbl.; m.p. abt. 132° c.; d.s. eth., c. aq.
580	104.5	**3,5-Dibromnitrobenzene, $Br_2.C_6H_3.NO_2$.** — ⟨*⟩ — Cryst.
582	104.5	**3-Brom-4-nitroaniline, $Br(NO_2).C_6H_3.NH_2$.** — *Yel.* Ndl.
585	105.4	**2,3-Dibrom-5-nitrotoluene, $Br_2.C_6H_2.Me,NO_2$.** — ⟨*⟩.
590	106	**2,5,6-Tribrom-4-nitrotoluene, $Br_3.C_6H.Me,NO_2$.** — ⟨*⟩.
595	106	**1,4-Dibrom-β-naphthylamine, $Br_2.C_{10}H_5.NH_2$.**
600	106	**p-Bromphenylhydrazine, $Br.C_6H_4.NH.NH_2$.** — Ndl. fr. aq. — Lft. fr. h. lgr.
605	107	**2,3,4,5-Tetrabromnitrobenzene, $Br_4.C_6H.NO_2$.** — ⟨*⟩ — Ndl. fr. alc. — Reductn. gives 2,3,4,5-tetrabromnitroaniline.
607	107	**Dibromdiphenylamine, $NH.(C_6H_4Br)_2$.** — Lust. pr. fr. alc. — E.s. alc., gl. ac. ac.
610	107–9	**3,3^1-Dibromhydrazobenzene, $(Br.C_6H_4.NH\text{-})_2$.** — Thick pr. — E.s. w. alc., eth. — Boiled w. conc. HCl gives dibrombenzidine, No. **51**.570.
615	108 (water free)	**N-Bromacetamide, Me.CO.NHBr.** — ⟨*⟩ — Tbl. fr. eth. (w. $1H_2O$, m.p. 70–80°). — E.s. c. eth. — S. conc. NaOH sol., hairlike cryst. of Me.CO.-NHNa separating. — Boiled w. NaOH sol. evolves methylamine, No. **2**.1059.
620	111-11.5	**3,3^1-Dibromazoxybenzene, $(Br.C_6H_4)_2N_2O$.** — *Pale yel.* broad ndl. — Alm. i. c. alc.
622	111.4	**4-Brom-2-nitroaniline, $Br(NO_2).C_6H_3.NH_2$.** — *Or.-yel.* ndl. fr. h. aq. — Sbl. — Vol. w. st. — S. in 7171 pt. aq. @ 20°; S. in 9.6 pt. alc. @ 21°.
623	112; 109–10	(α)-**3,5-Dibrompyridine, $C_5H_3Br_2N$.** — B.p. 222°. — Cryst. fr. alc. — Volat. w. st. — Sbl. in ndl. — D.s. h. aq., c. alc.; e.s. h. alc. — Unchanged by h. alk., conc. HNO_3 or h. $KMnO_4$ sol. — " V. weak base "; e.s. conc. HCl.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND BROMINE. — SOLIDS.
625	112; 102	**2-Brom-4-nitrophenol, $Br.C_6H_3(NO_2)(OH)$.** — ⟨**⟩ — Colorless ndl. fr. dil. alc. — E.s. alc., eth. — $Ba\bar{A}_2.6H_2O$: or.-yel. ndl.; r.d.s. aq. — $Me\bar{A}$: ndl.; m.p. 106°; s.h. aq.
630	112	**3,4,5-Tribromnitrobenzene, $Br_3.C_6H_2.NO_2$.** — ⟨*⟩ — Cryst. — D.s. c. alc. — Heated w. alc.-NH_3 @ 120° gives dibrom-p-nitraniline: m.p. 202.5°.
635	113	**Bromaceto-o-toluide, $Br.CH_2.CO.NH.C_6H_4.Me$.** — Ndl. fr. dil. alc.
640	114–5	**4,5-Dibrom-1,2-dinitrobenzene, $Br_2.C_6H_2.(NO_2)_2$.** — ⟨*⟩ — Ndl. fr. gl. ac. ac. — Vol. w. st. — D.s. c. alc., lgr. — Alc.-NH_3 gives 4,5-dibrom-2-nitroaniline, No. **51**.1099.
644	115	**2,4,6-Tribrom-3-aminophenol, $Br_3.C_6H.(NH_2)(OH)$.** — Silky ndl. — D.s. c. aq.; e.s. alc., eth., chlf., bz. — $FeCl_3$ colors aq. sol. green.
645	115	**p-Bromhydrazobenzene, $Br.C_6H_4.NH.NH.Ph$.** — Lust. tbl.
647	115–6	**p-Cyanbenzyl Bromide, $CN.C_6H_4.CH_2Br$.** — ⟨*⟩ — Odor v. irritating! — Pr. fr. alc. E.s. eth., chlf., bz; less s. alc.
650	116	**α-Bromisobutyric-α-naphthalide, $Me_2.CBr.CO.NH.C_{10}H_7$.** — Fine ndl. fr. chlf. — E.s. alc., chlf.; d.s. lgr.
655	116	**2,3,4,6-Tetrabromaniline, $Br_4.C_6H.NH_2$.** — ⟨**⟩ — Ndl.
660	117.5	**4,6-Dibrom-2-nitrophenol, $Br_2(NO_2).C_6H_2.OH$.** — ⟨**⟩ — Gold-yel. pr. fr. alc.! — Sbl. — Vol. w. st. — V.d.s. aq. — $K\bar{A}$: scarlet red ndl.; v.d.s. c. aq. — $Me\bar{A}$: greenish-yel. ndl.; d.s. c. alc.; m.p. 76.7°.
662	117	**5,8-Dibrom-1-nitronaphthalene, $Br_2.C_{10}H_5.NO_2$.** — *Yel.* ndl. — PBr_5 gives 1,4,5-tribromnaphthalene, No. **4**.815.
665	117.4	**2,4-Dibromdinitrobenzene, $Br_2.C_6H_2.(NO_2)_2$.** — ⟨*⟩ — Greenish-yel. ndl. — Vol. w. st. — V.d.s. c. alc. — Heating w. KOH sol. gives a bromdinitrophenol, m.p. 91.5°.
667	117	**1,4-Dibrom-2-nitronaphthalene, $Br_2.C_{10}H_5.NO_2$.** — *Ocher-colored* ndl.
670	117.5	**Acet-3-brom-4-toluide, $(C_2H_3O)NH.C_6H_3.Br,Me$.** — Ndl.
675	118	**4-Brom-3,5-dinitrotoluene, $Br.C_6H_2.Me,(NO_2)_2$.** — ⟨*⟩ — Pr. fr. HNO_3 (sp. gr. 1.36). — ("NaOH removes Br easily.")
680	118.2	**2-Brom-4,6-dinitrophenol, $Br(NO_2)_2.C_6H_2.OH$.** — ⟨**⟩ — S-yel. pr. fr. eth. — S. eth., h. alc. — $Na\bar{A}.1\frac{1}{2}H_2O$: golden ndl.; d.s. c. aq. — $Me\bar{A}$: yellowish pr. fr. eth. alc.; m.p. 47–8°.
685	118–8.6	**2,3,6-Tribrom-4-toluidine, $Br_3.C_6H.Me(NH_2)$.** — Vol. w. st.
690	118–19	**3,4,5-Tribromaniline, $Br_3.C_6H_2.NH_2$.** — ⟨**⟩ — Ndl. — I. aq.; e.s. alc., eth. — $\bar{B}$.HCl: ndl., partly decd. by aq.
695	118; 119–20	**2,4,6-Tribromaniline, $Br_3.C_6H_2.NH_2$.** — ⟨**⟩ — B.p. undecd. a. 300°. (Stable in T. **4**.4a & T. **4**.5). — I. c. 1 $\bar{N}$ aq.-NaOH sol. — $\bar{B}$.HCl: ppt. w. HCl gas fr. bz. sol. in small ndl. wh. lose most of HCl in air, (*v.* weak base). — (Brommation prod. of aniline.)
700	118–19	**2,4-Dibrom-α-naphthylamine, $Br_2.C_{10}H_5.NH_2$.** — Ndl. — E.s. alc., eth., chlf., lgr., bz. — CrO_3 added to gl. ac. ac. sol. gives transient indigo blue color. — Oxidin. w. dil. HNO_3 gives phthalic ac. (Vol. 1).
705	119	**"α"-Tetrabromquinoline, $Br_4.C_9H_3N$.** — Sbl. undecd. in ndl. — I. aq., dil. acids; s. alc., eth., CS_2. — Not at. by alc.-KOH @ 180°. — (Fr. quinoline & Br in CS_2 sol.).
710	120	**Benzoyl-m-bromanilide, $PhCO.NH.C_6H_4.Br$.** — Ndl. fr. alc.
715	121	**1,6-Dibrom-β-naphthylamine, $Br_2.C_{10}H_5.NH_2$.** — Ndl. — D.s. aq.; e.s. alc., bz. — Oxidn. w. dil. HNO_3 @ 190° gives 4-bromphthalic ac.,No. **4**.1560.
720	121–2	**Tribromacetamide, $CBr_3.CONH_2$.** — Monoclin. lft. — Sbl. — E.s. h. alc., eth.; d.s. c. CS_2, bz., chlf. — Warmed w. KOH sol. gives $CHBr_3$, NH_3 & CO_2!
725	122	**2,3,4,5-Tetrabromaniline, $Br_4.C_6H.NH_2$.** — Ndl. fr. alc.
727	122.5	**5-Brom-1-nitronaphthalene, $Br.C_{10}H_6.NO_2$.** — *Yel.* ndl. fr. alc. — S. in 297 pt. 93% alc. @ 15.7°. — E.s. eth., bz.; v.s. chlf. — Oxidn. w. $KMnO_4$ gives 3-bromphthalic & nitrophthalic ac.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND BROMINE. — SOLIDS.
730	124	**5-Brom-8-oxyquinoline, $HO.C_6H_2Br.C_3H_3N$.** — Ndl. fr. alc. — Sbl. — I. c. aq.; e.s. h. aq.
734	125	**α-Brompropion-p-toluide, $Me.CHBr.CO.NH.C_6H_4.Me$.** — Lft. fr. chlf. — I. lgr.
735	125	**α-Brombutyro-p-toluide, $Et.CHBr.CO.NH.C_6H_4.Me$.** — Pr. fr. alc. — E.s. alc., chlf., bz.
740	125.1	**2,4,6-Tribromnitrobenzene, $Br_3.C_6H_2.NO_2$.** — ⟨*⟩ — Pr. fr. chlf. — D.s. h. alc.; e.s. eth. — W. h. alc.-NH_3 gives 5,2-bromnitro-m-phenylenediamine.
745	125.5	**3,3^1-(m)-Dibromazobenzene, $(Br.C_6H_4\text{-})_2N_2$.** — Hairlike ndl. — D.s. h. alc.; e.s. eth., CS_2, bz.
750	125	**Diogenal, N-Dibrompropyl-C,C-diethylbarbituric Ac., ⌜$N(CH_2.CHBr.CHBr)$.-$CO.NH.CO.CEt_2.CO$⌝.** — Cryst. powd. — D.s. aq.; e.s. alc., h. bz. or 200 pt. 1% Na_2CO_3 sol. — Cf. Rosenthaler, p. 470, or Pharm. Zentralh. (1913) **54**, 1321, for reactions.
755	126–7	**p-Bromnitrobenzene, $Br.C_6H_4.NO_2$.** — ⟨*⟩ — B.p. 255–6 (th.i.). — W. alc.-NH_3 @ 180° gives p-nitraniline. — 100 pt. c. alc. dis. 1.4 g.
757	127.3	**2,4-Dibrom-6-nitroaniline, $Br_2(NO_2).C_6H_2.NH_2$.** — *Or.-yel.* ndl.
760	128	**3-Brom-4,4^1-azotoluene, $Br,Me.C_6H_3.N_2.C_6H_4Me$, (Me = 4).** — *Or.-yel.* lft. — E.s. eth., acetone, bz.
765	129	**Tetrabrommethyldiphenylamine, $(C_6H_3Br_2).NMe$.** — Cryst. — S. alc.; v.s. bz.
770	130	**3,6-Dibromquinoline, $Br_2.C_9H_5N$.** — Ndl. — Hydrochloride: m.p. 185°.
773	130	**3,4,5-Tribrom-2-nitroaniline, $Br_3(NO_2).C_6H.NH_2$.** — *Or.-yel.* ndl. — D.s. h. aq.; e.s. alc.
775	130	**2,3,5,6-Tetrabromaniline, $Br_4.C_6H.NH_2$.** — Lust. ndl. fr. alc. — (Can be diazotized in con. HCl w. strong stirring.)
780	130–1	**Bromacetylanilide, $CH_2Br.CO.NH.C_6H_5$.** — Ndl. fr. dil. alc. — E.s. alc., eth., bz. — Fusion w. KOH gives indigo, aniline & phenylisocyanide.
785	130	**4,4^1-Dibromhydrazobenzene, $(Br_2C_6H_4)_2.N_2H_2$.** — Ndl. — E.s. alc., eth. — Boiled w. HCl dec. smoothly to 4,4^1-dibromazobenzene, No. **51**.1100 & p-bromaniline!
787	131	**2,3,6-Tribrom-3-nitroaniline, $Br_3(NO_2).C_6H.NH_2$.**
788	131–2	**4-Brom-3-nitroaniline, $Br(NO_2).C_6H_3.NH_2$.** — Ndl. fr. alc. — E.s. alc., eth. chlf.
789	131–2	**4-Brom-2-nitronaphthalene, $Br.C_{10}H_6.NO_2$.** — *Light yel.* ndl. — Sbl. — E.s. alc., eth. — Reductn. w. Sn + HCl gives β-naphthylamine, No. **2**.781. — Oxidn. gives phthalic ac. (T. **1**.905).
790	131	**α-Brompropionyl-o-toluide, $Me.CHBr.CO.NH.C_6H_4.Me$.** — Ndl. — E.s. eth., chlf.; i. lgr. — (Alc.-KOH gives anti- & para-di-o-tolyl-2,4-dimethyl-1,3-diacipiperazine.)
795	134	**α-Brombutyryl-β-naphthalide, $Et.CHBr.CO.NH.C_{10}H_7$.** — Ndl. fr. eth.-alc. — E.s. alc.; i. lgr.
800	135	**α-Bromisobutyryl-β-naphthalide, $Me_2.CBr.CO.C_{10}H_7$.** — Cryst. fr. bz. — E.s. eth., bz.; i. lgr.
805	135.5	**2,4,5-Tribrom-1,3-dinitrobenzene, $Br_3.C_6H.(NO_2)_2$.** — ⟨*⟩ — Yellowish scales. — V.d.s. c., e.s. h. alc. — (Alc.-NH_3 gives bromdinitrophenylenediamine.)
810	136	**4-Brom-2-acetamino-1,3-xylide, $Br.C_6H_2.(C_2H_3O_2NH)Me_2$.** — Ndl.
815	138–9	**Dibromacetylanilide, $CHBr_2.CO.NH.C_6H_5$.**
820	138	**Acettetrabrom-β-naphthalide, $Br_4.C_{10}H_3.NH.C_2H_3O$.** — Sm. ndl. — E.s. warm alc., d.s. c. — (Not saponified by boiling conc. KOH sol.).
822	139	**5-Brom-2-nitroacetanilide, $Br(NO_2).C_6H_3.NH(CO.Me)$.** — Ndl. — Vol. w. st. — E.s. chlf., bz.
823	139–40	**3-Brom-6-nitrobenzoic Ac., $Br(NO_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 246. — Monoclin. cryst. — $Ba\bar{A}_2.4H_2O$: cryst. alm. equally s. h. or c. aq. — $Et\bar{A}$: m.p. 55°.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND BROMINE. — SOLIDS.
825	140	**Acet-1-brom-β-naphthalide, $Me.CO.NH.C_{10}H_6Br$.** — Ndl.
830	141	**2,6-Dibrom-4-nitrophenol, $Br_2(NO_2).C_6H_2.OH$.** — ⟨**⟩ — Colorless cryst. fr. alc. — KĀ: or.-yel. ndl. — MeĀ: ndl.; d.s. c. alc.; m.p. 122.6°.
835	141–2	**m-Brombenzaldehydephenylhydrazone, $Br.C_6H_4.N_2H.Ph$.** — *Yel.* ndl. fr. abs. alc.
839	143	**1-Brom-4,8-dinitronaphthalene, $Br.C_{10}H_5.(NO_2)_2$.** — (" Not at. by h. NaOH sol.").
840	143	**3-Brom-2,4,6-trinitrotoluene, $Br.C_6H.Me(NO_2)_3$.** — ⟨*⟩ — Ndl. fr. alc. — Alm. i. c. alc. — Alc.-ammon. gives trinitro-m-toluidine.
842	143	**4-Brom-3-nitroacetanilide, $Br(NO_2).C_6H_3.NH(CO.Me)$.** — Ndl. fr. aq.
843	146	(a)-**p-Nitrophenyl-α-bromacrylic Ac., $NO_2.C_6H_4.CH : CHBr.CO_2H$.** — ⟨*⟩ — E.s. alc., eth., chlf.; d.s. h. CS_2; much more s. aq. than " b " acid. — $Ba\bar{A}_2$: dec. to nitrophenylacetylene, No. **2**.2187, CO_2 & $BaBr_2$ on boiling w. aq. — EtĀ: yel. pr; e.s. alc.; m.p. 63°.
845	146	**Acetylamino-2,4-dibromaniline, $C_2H_3O.NH.C_6H_3.Br_2$.** — Cryst.
850	146d.	**2,4,6-Tribromphenylhydrazine, $Br_3.C_6H_2.NH.NH_2$.** — E.s. chlf., bz., h. alc.
855	146–7	**4,4¹-Dibromdiazoaminobenzene, $Br.C_6H_4.N_3H.C_6H_4.Br$.** — *Yel.-red* lft. or ndl.
860	147	**Brom-3-nitrophenol, $Br.C_6H_3.(NO_2)(OH)$.** — ⟨**⟩ — *Yel.* ndl. fr. HCl. — D.s. h. aq.; e.s. alc., eth. — $K\bar{A}.2H_2O$: fiery red cryst. — MeĀ: ndl. fr. alc.; m.p. 103–4°.
865	147–8	**3,5-Dibrom-2,6-dinitrophenol, $Br_2.(NO_2)_2.C_6H.OH$.** — ⟨**⟩ — Thick *yel.* ndl. fr. dil. alc. — E.s. alc., eth.; alm. i. lgr.
870	148	**α-Bromisobutyramide, $Me_2CBr.CONH_2$.** — ⟨*⟩ — Clear pr. fr. chlf. — Boiling w. KOH sol. dec. to HCN, KBr & acetone.
875	abt. 150	**Antipyrin Bromide, $C_{11}H_{11}N_2OBr_2$.** — ⟨T. **4**.5⟩ — E.s. alc., chlf.; i. eth., lgr. — C. aq. dec. at once to HBr & bromantipyrin.
880	151	**α-Brombutyric-α-naphthalide, $Et.CHBr.CO.NH.C_{10}H_7$.** — ⟨*⟩ — Ndl. fr. alc. — D.s. alc., eth.; i. lgr.
882	151.4	**3-Brom-6-nitroaniline, $Br(NO_2).C_6H_3.NH_2$.** — *Red-yel.* ndl. — Long contact w. HNO_3 (Sp. gr. 1.38) gives a bromdinitrophenol, m.p. 81.4°.
885	151.5–2	**2,2¹-(m-) Dibrombenzidine, $(Br.(NH_2).C_6H_3\text{-})_2$.** — Cryst. — S. c. alc.; e.s. bz., h. alc.
887	153–4	**2-Brom-4,6-dinitroaniline, $Br(NO_2)_2.C_6H_2.NH_2$.** — *Yel.* ndl. — Sbl. — Boiling w. KOH dec. to NH_3 & bromdinitrophenol.
890	154	**Bromural, Bromisovalerianylurea, $Me_2CH.CHBr.CO.NH.CO.NH_2$.** — ⟨*⟩ — (Hypnotic. M.p. of commercial product abt. 147°). — Ndl. — D.s. c. aq.; e.s. h. aq. — Warmed w. conc. H_2SO_4 gives offensive odor of isovalerianic ac.! — Boiling w. 10% NaOH gives off NH_3. — Heated in alc. sol. for some hrs. on water bath w. sod. ethylate, removing KBr & concentrating, separates a comp. crystg. fr. aq. w. m.p. 208°. (Rosenthaler, p. 470.)
895	155–6	**o-Brombenzamide, $Br.C_6H_4.CONH_2$.** — Ndl. fr. aq. — Sbl. fr. 100°. — D.s. eth.
900	155	**Dibromacetamide, $CHBr_2.CONH_2$.** — Ndl.
905	157	**p-Brombenzeneazophenol, $Br.C_6H_4.N_2.C_6H_4.OH$.** — *Brown-red* ndl. fr. toluene! — V.s. alc., eth., acetone. — Benzoate; m.p. 166°.
910	156–7	**5-Brom-o-acettoluide, $Br.C_6H_3Me.COMe$.** — Ndl. — E.s. alc. — (Fr. bromination of o-acettoluide.)
915	155–60	**β-Bromethylamine, $BrCH_2.CH_2.NH_2$.** — ⟨*⟩ — Cryst. — E.s. aq. — Conc. KOH sep. oily, bad smelling, unstable base.
919	158; 155 sl.d.	**2-Brom-4-aminophenol, $Br.C_6H_3.(NH_2)(OH)$.** — Cryst. fr. dil. alc. — D.s.c aq.; e.s. alc., eth., chlf., bz.
920	158	**α-Brompropionic-α-naphthalide, $Me.CHBr.CO.NH.C_{10}H_7$.** — ⟨*⟩ — Ndl. fr. chlf. — D.s. eth., chlf., bz.
925	158 sl.d.	**2,4,6,2¹,4¹,6¹-Hexabromdiazoaminobenzene, $(Br_3.C_6H_2)_2.N_3H$.** — Ndl. fr. bz. — I. alc.; v.d.s. eth.; e.s. h. bz. — (Fr. tribromaniline & HNO_2).

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND BROMINE. — SOLIDS.
927	158	**2,4,6-Tribrom-m-phenylenediamine,** $\mathbf{Br_3.C_6H.(NH_2)_2}$. — Long silky ndl. fr. alc. — E.s. eth., chlf., bz.; v.d.s. lgr. — Sn + HCl gives m-phenylenediamine, No. **2**.634.
930	160; 159	**3,6-Dibrom-1,2-dinitrobenzene,** $\mathbf{Br_2.C_6H_2.(NO_2)_2}$. — ⟨*⟩ — Ndl. — E.s. h. alc. — @ 100° w. alc.-NH_3 in tube gives p-dibromnitroaniline, m.p. 75°.
935	161	**Acetyl-p-bromphenylhydrazine,** $\mathbf{Me.CO.NH.NH.C_6H_4Br}$. — Ndl. fr. alc. — E.s. w. alc.; v.d.s. eth., chlf., lgr., bz.
936	162	**3,4-Dibrom-2(or 6)-nitrobenzoic Ac.,** $\mathbf{Br_2(NO_2).C_6H_2.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 295. — Ndl. — Sbl. (sl.d.). — Reductn. gives finally o-aminobenzoic ac., No. **2**.148. — $Ba\bar{A}_2.H_2O$: lft.; e.s. aq.
937	162	**3,5-Dibromnitrobenzoic Ac.,** — **(Fr. 3,5-dibrombenzoic ac. & fuming** $\mathbf{HNO_3}$**).** — ⟨G.O.-E.⟩ — N. Eq. 295. — Ndl. fr. aq. — D.s. aq. — Reduction gives dibromaminobenzoic Ac.; m.p. 196°. — $Ba\bar{A}_2.2H_2O$: fine ndl.
938	163	**4-Brom-2-nitrobenzoic Ac.,** $\mathbf{Br.(NO_2).C_6H_3.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 246. — Lust. ndl. fr. h. aq. — E.s. alc., eth., chlf., bz. — $Ag\bar{A}$- ppt.
939	163–4	**2-Brom-4-nitrobenzoic Ac.,** $\mathbf{Br(NO_2).C_6H_3.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 246. — Long ndl. fr. aq. — Sbl. fr. 150°. — E.s. dil. alc., eth. — Sn + HCl red. to 3-bromaniline & CO_2. — $Ag\bar{A}$: ppt.; cryst. fr. h. aq. in fine ndl.
940	164	**Bromacet-p-toluide,** $\mathbf{CH_2Br.CO.NH.C_7H_7}$. — Ndl.
945	165.4; 167–8	**p-Bromacetanilide,** $\mathbf{Br.C_6H_4.NH(C_2H_3O)}$. — Monoclin. pr. — Alm. i. c. aq.; mod. s. alc.
950	167.5	**2,4,2¹,4¹-Tetrabromdiazoaminobenzene,** $\mathbf{Br_2.C_6H_3.N_3H.C_6H_3.Br_2}$. — Fine *gold-yel.* ndl.! — V.d.s. h. alc., eth. — (Fr. dibromaniline & HNO_2).
955	168	**2,3,5,6-Tetrabromnitrobenzene,** $\mathbf{Br_4.C_6H.NO_2}$. — ⟨*⟩ — Lft. fr. alc.
960	168.5–9.5; 172; 175	**4,4¹-Dibromazoxybenzene,** $\mathbf{(Br.C_6H_4)_2N_2O}$. — *Yel.* lft. fr. alc.! — E.s. h. alc., bz.
965	169	**Quinolinephenacylbromide,** $\mathbf{C_9H_7NBr.CH_2.CO.Ph}$. — ⟨*⟩ — Long, silky, colorless ndl. w. $1H_2O$ fr. dil. alc., m.p. 117–8° when only air dry. — E.s. aq., alc.; v.d.s. eth., bz. — Dec. e. to 1²-bromacetophenone, No. **4**.375, & quinoline, No. **2**.1356.
967	169–170.5 (browning)	**2,4,6-Tribrom-3-aminobenzoic Ac.,** $\mathbf{Br_3(NH_2).C_6H.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 374. — Ndl. — D.s. c., e.s. h. aq.; v.s. alc. — Distn. dec. largely to CO_2 & tribromaniline, No. **51**.695! $Ba\bar{A}_2.6H_2O$: lft. V.s. aq.
970	169.5	**3,6,8-(γ-)Tribromquinoline,** $\mathbf{Br_3.C_9H_4N}$. — Sbl. in silky ndl. — E.s. h. alc., eth., chlf. — $\bar{B}_2.H_2PtCl_6$: yel. cryst. ppt.
975	170	**Tribromacetonitrile,** $\mathbf{Br_3C.CN}$. — Polym. by persistent treatment w. dry HCl gas to $(Br_3C.CN)_3$: ndl. fr. alc.; m.p. 129–30°.
976	170.5	**1-Brom-4,5-dinitronaphthalene,** $\mathbf{Br.C_{10}H_5.(NO_2)_2}$. — ⟨*⟩ — Glassy ndl.
977	171	**5-Brom-2-nitrocinnamic Ac.,** $\mathbf{Br(NO_2).C_6H_3.CH:CH.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 272. — Lust. ndl. fr. dil. alc. — E.s. alc., eth., chlf.; i. lgr.
978	171–2	**3-Brom-2-aminobenzoic Ac.,** $\mathbf{Br(NH_2).C_6H_3.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 216. — Ndl. — $Ba\bar{A}_2.H_2O$: warty e.s. ndl.
980	174	**α-Brompropionyl-β-naphthalide,** $\mathbf{Me.CHBr.CO.NH.C_{10}H_7}$. — Pearly ndl. fr. alc. — D.s. eth., bz.; i. lgr.
982	173–5; 172.5–8.5d.	**Succinbromimide,** $\mathbf{C_4H_4O_2NBr}$. — ⟨*⟩ — Short pr. fr. bz. — D.s. eth., bz.; e.s. acetone. — Aq. dec. to succinimide, No. **2**.2037 & HBrO.
985	175	**5-Brom-3-nitrosalicylic Ac. — (1),** $\mathbf{Br(NO_2)(HO)C_6H_2.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 262. — *Yel.* ndl. crystg. w. $1H_2O$, lost @ 100–110°. — At 210° dec. to CO_2 & 4-brom-2-nitrophenol, No. **51**.440. — $Ba\bar{A}_2$: red-yel. ndl.
986	179–80	**2-Brom-5-nitrobenzoic Ac.,** $\mathbf{Br(NO_2).C_6H_3.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 246. — Ndl. fr. aq. — Sbl. — V.d.s. c. aq. — Chloride: cryst. fr. bz.; i. lgr.; m.p. 63°. — Amide: ndl. fr. alc.; i. chlf., bz.; m.p. 197—8°.
987	180	**6-Brom-3-aminobenzoic Ac.,** $\mathbf{Br(NH_2).C_6H_3.CO_2H}$. — ⟨G.O.-E.⟩ — N. Eq. 216. — Broad ndl.
988	180	**6-Brom-3-nitroanilide,** $\mathbf{Br(NO_2).C_6H_5.NH(CO.Me)}$. — Ndl.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND BROMINE. — SOLIDS.
990	181	**4-Brom-3,5-dinitrobenzoic Ac., $Br(NO_2)_2.C_6H_2.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 291. — Tbl. — D.s. aq.; e.s. alc. — W. x.s. NaOH sol. gives 4-hydroxy-3, 5-dinitrobenzoic ac.; w. NaOEt, an unstable purple cryst. comp.
995	182	**Tetrabromdiphenylamine, $(C_6H_3Br_2)_2NH$.** — Ndl. — I. aq.; d.s. h. alc.
999	186	**3,5-Dibrom-2-nitroaniline, $Br_2(NO_2).C_6H_2.NH_2$.** — Sbl. in *yel.* ndl.
1000	186; 189.5 c.; 190	**p-Brombenzamide, $Br.C_6H_4.CONH_2$.** — Pearly rect. tbl. — I. c. aq., bz., lgr.; mod. s. alc.; d.s. abs. eth.
1005	186.5	**3-Brom-β-acetnaphthalide, $Br.C_{10}H_6.NH.C_2H_3O$.** — Ndl.
1010	187	**$2,2^1$-(o-)Dibromazobenzene, $(Br.C_6H_4\text{-})_2N_2$.** — Lust. *golden* scales! — D.s. alc., eth. — Reduction gives o-bromaniline, No. **51**.85.
1015	187	**Acet-3-brom-α-naphthalide, $CH_3.CO.NH.C_{10}H_6Br$.** — Ndl.
1016	189–9.5	**4-Brom-1,3,6,8-tetranitronaphthalene, $Br.C_{10}H_3.(NO_2)_4$.** — ⟨*⟩ — Ndl. — S. in 27 pt. bz. @ 18°. — C. NaOH sol. gives α-tetranitronaphthol.
1017	190	**2,6-Dibrom-4-aminophenol, $Br_2.C_6H_2.(NH_2)(OH)$.** — Mic. ndl. — Blues in air. — I. aq.; s. eth.; e.s. alc. — Acetyl deriv.: lft. fr. alc.; m.p. 173–4°; e.s. alk.
1020	192	**2,4,6-Tribromdinitrobenzene, $Br_3.C_6H.(NO_2)_2$.** — ⟨*⟩ — Ndl. — Sn + HCl gives m-phenylenediamine.
1025	192	**2,6-Dibrombenzamide, $Br_2.C_6H_3.CONH_2$.** — Ndl. fr. aq.
1035	191–2; 193–4	**2,4,6-Tribrombenzamide, $Br_3.C_6H_2.CONH_2$.** — Ndl. — D.s. h. aq.; e.s. alc.
1040	193	**Acet-4-brom-α-naphthalide, $C_2H_3O.NH.C_{10}H_6Br$.** — Ndl. fr. alc. — I. h. aq.; e.s. h. alc.
1045	194	**2,4,6-Tribromdinitrophenol, $Br_3(NO_2)_2.C_6.OH$.** — ⟨**⟩ — Ndl. fr. dil. alc. — E.s. alc., eth. — $Et\bar{A}$: pr. fr. alc.; i. lgr.; m.p. 147°.
1050	195	**2,4-Dibrombenzamide, $Br_2.C_6H_3.CONH_2$.** — Ndl. fr. dil. alc.
1055	196	**5,7-Dibrom-8-oxyquinoline, $HO.C_9H_4Br_2N$.** — Silky ndl. — Alm. i. aq.; v. d. s. c. alc.; e.s. conc. min. ac., eth., bz.; i. lgr., dil. acids. — (Not at. by h. NaOH sol.)
1060	196–200d.	**Hexamethylenetetramine Dibromide, $C_6H_{12}N_4Br_2$.** — Lust. *yel.* tbl.
1065	197	**3-Brom-4-nitrobenzoic Ac., $Br(NO_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 246. — Ndl. — E.s. alc. — $Ba\bar{A}_2.1\frac{1}{2}H_2O$: ndl.; e.s. h. aq.
1070	198	**Benzoyl-2,4,6-tribromanilide, $PhCO.NH.C_6H_2.Br_3$.** — Ndl. fr. alc.
1075	198 (dried @ 100°)	**Pyridinephenacyl Bromide, $C_5H_5NBr,CH_2.CO.Ph$.** — Cryst. w. $1H_2O$. — E.s. aq., dil. alc.; alm. i. eth.
1085	199	**4-Brom-3-nitrobenzoic Ac., $Br.(NO_2).C_6H_3.CO_2H$.** — ⟨G.O.-E.⟩ — N. Eq. 246. — Lft. — D.s. c. aq. — Sbl. in ndl. — E.s. alc. — Chloride: m.p. 51–3°; cryst.; d.s. lgr. — Amide: ndl. fr. alc.; m.p. 156°.
1090	200	**4-Brom-2-nitro-1-naphthylamine, $Br(NO_2).C_{10}H_5.NH_2$.** — Long *orange* cryst. E.s. h. alc., bz. chlf.; d.s. CS_2. — Oxidn. by dil. boiling HNO_3 (T. **1**.905–3) gives phthalic ac. (Vol. I).
1095	202	**Benzoyl-p-bromanilide, $PhCO.NH.C_6H_4Br$.** — Tbl.
1097	202; 202.5; 206–7	**2,6-Dibrom-4-nitroaniline, $Br_2(NO_2).C_6H_2.NH_2$.** — Thin ndl.
1098	204–5	**3,4-Dibrom-6-nitroaniline, $Br_2(NO_2).C_6H_2.NH_2$.** — *Or.-yel.* ndl. fr. dil. alc. — Sbl. — E.s. alc., eth., bz.
1099	205	**(β)-p-Nitrophenyl-α-bromacrylic Ac., $NO_2.C_6H_4.CH{:}CBr.CO_2H$.** — ⟨T. **4**. 3-a.⟩ — Yellowish ndl. — D.s. c. aq., h. CS_2; e.s. alc., eth., chlf., lgr. — $Ba\bar{A}_2$: dec. on boiling w. aq. to nitrophenylacetylene, No. **2**.2187, CO_2 & $BaBr_2$. — $Et\bar{A}$: yellowish ndl.; m.p. 93°.
1100	205	**$4,4^1$-(p-) Dibromazobenzene, $(Br.C_6H_4\text{-})_2N_2$.** — *Yellow* ndl. fr. bz. — Dist. — R.d.s. alc.
1115	205	**Isoquinolinephenacylbromide, $C_9H_7N + Ph.CO.CH_2Br$.** — Pr. fr. alc. — E.s. aq., alc.; d.s. eth., bz. — (By mixing bz. sol. of isoquinoline & phenacylbromide).

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND BROMINE. — SOLIDS.
1120	207	**3,5-Dibrom-2-bromacettoluide,** $Br_2.C_6H_2Me.NH.CO.CH_2Br$. — ⟨*⟩ — Ndl. fr. gl.ac.ac. — D.s. h. alc.; more s. bz.; mod. s. h. chlf., gl. ac. ac.
1125	207	**"β"-Tetrabromquinoline,** $Br_4.C_9H_3N$. — Silky fibers. — (Fr. aq.-Br. & quinoline.)
1130	210.5	**Nitro-p-acettoluide,** $(NO_2)Me.C_6H_3.NH(C_2H_3O)$. — Ndl.
1132	211–2d.	**o-Nitrophenyl-α-bromacrylic Ac.,** $NO_2.C_6H_4.CH : CBr.CO_2H$. — ⟨T. **4**.3-a⟩ — Ndl. — D.s. h. aq.
1133	211.5–12	**5-Brom-2-aminobenzoic Ac.,** $Br(NH_2).C_6H_3.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 216. — Long ndl. — Vol. without decn. — V.d.s. aq.; s. alc., eth., chlf., bz. — $Ba\bar{A}_2.4H_2O$: V.s. ndl.; loses $3H_2O$ @ 100°.
1134	211–3	**m-Nitrophenyl-α-bromacrylic Ac.,** $NO_2.C_6H_4.CH:CBr.CO_2H$. — ⟨T. **4**.3-a⟩ — ndl. fr. h. aq.
1135	213	**2,4,6,2¹,4¹,6¹-Hexabromazobenzene,** $(Br_3C_6H_2-)_2N_2$. — *Red* ndl. fr. bz. — D.s.
1140	214	**Tribromglyoxalin,** $C_3HBr_3N_2$. — Ndl. — I. c., s. h. aq.; d.s. eth., chlf., CS_2. — Behaves as an acid; s. alk.! — Sol. gives ppt. w. heavy metals.
1145	215	**2,4,6-Tribrom-3-nitrotoluene** $Br_3.C_6H.(NO_2)Me$. — ⟨*⟩ — Leafy cryst. — D.s. alc.; e.s. bz.
1150	218	**Hexabromdiphenylamine,** $(C_6H_2Br_3)_2NH$. — Pr. fr. bz. — Alm. i. alc. — (By brom. of diphenylamine in gl. ac. ac.)
1155	217–20	**2,4,6-Tribromdinitrotoluene,** $Br_3(NO_2)_2.C_6.Me$. — Cryst. fr. alc.
1160	222	**3-Brom-5-nitrosalicylic Ac.-(1),** $Br(NO_2)(HO).C_6H_2.CO_2H$. — N. Eq. 262. — Cryst. fr. h. aq.; v.s. alc., eth. — $Ba\bar{A}_2$: long yel. ndl.
1162	222	**4-Brom-2-aminobenzoic Ac.,** $Br(NH_2).C_6H_3.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 216. — Long ndl. — E.s. h. aq.; e.s. alc., eth., chlf.
1164	225	**4-Brom-3-aminobenzoic Ac.,** $Br(NH_2).C_6H_3.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 216. — Sm. ndl. — $Pb\bar{A}_2$: i. ppt.
1165	225	**2,4-Dibrom-α-acetnaphthalide,** $Br_2.C_{10}H_5.NH(C_2H_3O)$. — Ndl. — E.s. alc., chlf., gl. ac. ac.; less s. bz.; d.s. CS_2. — NaOH gives dibromnaphthylamine: m.p. 118–9°; No. **51**.200.
1167	225–6	**3,4-Dibrom-2(or 6)-aminobenzoic Ac.,** $Br_2(NH_2).C_6H_2.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 295. — Ndl. fr. alc. — V.d.s. aq. chlf., eth., bz.; s. alc. — Na-amalgam gives 2-aminobenzoic ac. — $Ba\bar{A}_2.4H_2O$:ndl.; r.d.s. aq.
1170	226–7	**Tetrabrom-4-toluidine,** $Br_4.C_6.Me(NH_2)$. — Ndl.
1175	227–8	**1,2,3,5-Tetrabromdinitrobenzene,** $Br_4.C_6H.NO_2$. — Cryst. fr. alc. or bz. — Sbl.
1180	229–30	**3,5-Dibromtrinitrotoluene,** $C_6.Br_2(NO_2)_3Me$. — Pr. fr. alc.
1185	232; 229	**4-Brom-2-nitro-1-acetnaphthalide,** $Br(NO_2)C_{10}H_5.NH.C_2H_3O$. — ⟨*⟩ — Long *yel.* ndl. — Boiled w. conc. NaOH sol. gives NH_3 & bromnitronaphthol.
1190	232	**2,4,6-Tribromacetanilide,** $Br_3.C_6H_2.NH.CO.Me$. — Cryst.
1192	233–4	**3,5-Dibrom-2-nitrobenzoic Ac.,** $Br_2(NO_2).C_6H_2.CO_2H$. — ⟨G.O.-E.⟩ — Ndl. — N. Eq. 295 alm. i. c. aq.; e.s. h. alc, eth; r.d.s. c. bz. — $Ba\bar{A}_2.4H_2O$: ndl; d.s.c. aq.
1195	234–5c.	**Pentabromnitrobenzene,** $Br_5.C_6.NO_2$. — Ndl. fr. alc. — D.s. alc.; e.s. eth., chlf., CS_2.
1199	245	**4-Brom-1,3,5,8-tetranitronaphthalene,** $Br.C_{10}H_3.(NO_2)_4$. — Alm. i. h. alc., bz.; v.d.s. h. gl. ac. ac. — Oxidn. w. dil. HNO_3 gives 3,6-dinitrophthalic ac., No. **2**.334.
1200	245–6	**Tetrabromdi-(β,β)-naphthylamine** $(Br_2C_{10}H_5)_2.NH$ (?). — Long felted ndl. fr. bz. — D.s. c. alc., bz., gl. ac. ac.; alm. i. eth., lgr.
1205	250	**3-Brom-2-nitrobenzoic Ac.,** $Br(NO_2).C_6H_3.CO_2H$. — ⟨G.O.-E.⟩ — N. Eq. 246. — Large monoclin. cryst. fr. eth. — V.d.s. aq. — Reductn. gives m-aminobenzoic ac. — $Et\bar{A}$: cryst.; m.p. 80°.
1210	250	**Dibromisatine,** $Br_2.C_8H_3NO_2$. — *Or.* pr. fr. alc. — S. KOH sol. w. red color!

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND BROMINE. — SOLIDS.
		— Distn. w. KOH gives a dibromaniline. — KĂ: blue-violet; v.d.s. aq.; stable.
1215	255	**m-Bromisatine, $\mathbf{Br.C_6H_4.NO_2}$.** — Lust. pr. — Distn. w. KOH gives bromaniline. — Alc.-$(NH_4)_2S$ in air gives bromindigo!
1220	261-2c. (Sinters @ 254°)	**Pentabromaniline, $\mathbf{Br_5.C_6NH_2}$.** — Ndl. — Not diazotizable.
1222	274	**Dibrom-1,5-diaminoanthraquinone, $\mathbf{Br_2(NH_2)_2.C_{14}H_4O_2}$.** — (D.R.P.).
1225	284-6	**s-Tetrabrombenzidine, $\mathbf{(Br_2(NH_2).C_6H_2\text{-})_2}$.** — Sbl. in fine lust. ndl.! — I. aq., acids; s. alc., eth., CS_2, bz.
1230	285	**Tribromtrinitrobenzene, $\mathbf{Br_3.C_6.(NO_2)_3}$.** — (*) — Hexag. pr. fr. bz. — Sbl. fr. 175°. — I. c. alc.; c.s. chlf., eth., bz. — Alc.-NH_3 gives trinitrotriaminobenzene.
1235	287	**Brom-β-aminoalizarine, $\mathbf{Br(NH_2)(HO)_2.C_{14}H_4O_2}$.** — *Brown* ndl. fr. gl. ac. ac. — I. aq. — Sol. in h. NaOH sol. yel. brown, becoming magenta colored on standing in air. — (D.R.P. 126603). — (Heated w. aromat. amines gives comps. whose sulphonic acids are blue-black, blue to green dyes.)
1245	302-5	**Octabromdiphenylamine, $\mathbf{NH(C_6HBr_4)_2}$.** — Pr. fr. chlf. — D.s. bz., chlf.

ANALYTICAL TABLES
OF
ORDER LI

COMPOUNDS CONTAINING NITROGEN AND BROMINE AS "ADDITIONAL ELEMENTS"

DIVISION B, LIQUID SPECIES.

No.	Boiling-point (C.°)	Specific Gravity	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
1300	abt. 83d.		**2-Brom-2-nitrosopropane, Me.CBr(NO).Me.** — Mobile, v. unstable, ultramine-blue liq.! — Odor pungent & disagreeable. — Vapors in thick layers, blue & v. irritating! — I. aq.; e.s. alc., eth., bz. — Boiling aq. gives acetone, etc.
1310	146–7		**1-Brom-1-nitroethane, Me.CHBr(NO_2).** — Odor irritating like chlorpicrin! — I. aq.
1315	147.5–9.5		**Bromnitromethane, $CH_2Br.NO_2$.** — Penetrating, irritating odor! — I. aq.; s. alk.
1320	149–50	1.771	**Bromacetonitrile, $BrCH_2.CN$.** — E. saponified.
1325	165		**1,1-Dibromnitroethane, Me.$CBr_2(NO_2)$.** — I. aq. or KOH sol.
1330	169.5; 173	1.645 (0/4) 1.632 (10)	**3-Brompyridine, C_5H_4BrN.** — Strongly refractive oil. — Somewhat s. aq.
1632	192–4	1.657 (15°)	**2-Brompyridine, C_5H_4NBr.** — D.s. aq. — $\bar{B}.HAuCl_4$. — **Lft. fr.** HCl; m.p. 173°.
1335	250–51		**o-Bromaniline.** — Cf. No. **51**.85; m.p. 31–1.5°.
1340	251		**m-Bromaniline.** — Cf. No. **51**.55; m.p. 18–8.5
1345	259c.		**3-Bromdimethylaniline, Br.$C_6H_4NMe_2$.** — M.p. + 11°. — W. HNO_3 gives green deriv.: m.p. 148° d.
1350	259–60		**4-Brommethylaniline, Br.C_6H_4.NHMe.** — M.p. 11°. — Nitrous ac. gives p-bromnitrosomethylaniline, (Ber. **12**, 1816): ndl fr. alc.; m.p. 74°. — Dec. above b.p. to red dyestuff.
1355	270d.; 274–6		**3-Bromquinoline, Br.C_9H_6N.** — Liq. @ 0°; m.p. 25°. — Unchanged by boiling alc.-KOH sol. — $\bar{B}$.Pk: fine yel. ndl.; m.p. 190°. — $\bar{B}$.MeI: yel. cryst.; e.s. aq.; m.p. 265–70°.
1360	278; 284		**6-(p-Bz-3-)Bromquinoline, Br.C_9H_6N.** — M.p. 18–9°; 24°. — V. stable. — NaOEt @ 160–70° gives quinoline. — $\bar{B}.HCl + H_2O$: ndl.; v.s. aq.; m.p. 213° d. — $\bar{B}$.Pk: ppt. of fine yel. ndl.; m.p. 216–7°. — $\bar{B}$.MeI: chrome yel. ndl.; m.p. 278°.
1365	302–6		**8-Bromquinoline, Br.C_9H_6N.** — Liq. — $\bar{B}.HCl + H_2O$: v.s. aq.; m.p. 166°. — $\bar{B}_2.H_2PtCl_6$. + 2 or $3H_2O$: red-yel. cryst. ppt. (Anhydrous salt, m.p. 252°.).

CHAPTER IX

ORDER LII

COMPOUNDS CONTAINING NITROGEN AND IODINE AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

The tabulated species of Order LII include no strong acids or strong bases. Many species are colored. The Order has two Divisions, A and B, neither of which is subdivided.

Read the lettered " General Observations " on the species of Order L at the beginning of Chapter VII. The remarks made in that place on the *chlorine* compounds of Order L are equally applicable as suggestions in identifying the corresponding *iodine* compounds of Order LII. All references to " General Observations " enclosed in pointed parentheses in the Analytical tables of Order LII are, accordingly, inserted to direct attention to the correspondingly lettered paragraphs of Order L on page 122.

The iodoalkylates (alkyl iodide addition-products of amines containing tertiary nitrogen) of this order may be expected to generally give the reactions for loosely bound iodine in Test **4.5** or **4.4-a.**

ANALYTICAL TABLES

OF

ORDER LII

COMPOUNDS CONTAINING NITROGEN AND IODINE AS "ADDITIONAL ELEMENTS"

DIVISION A, SOLID SPECIES.

No.	Melting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	25; 27	**m-Iodaniline, $I.C_6H_4.NH_2$.** — ⟨**⟩ — Lft.
55	34; 36	**m-Iodnitrobenzene, $I.C_6H_4.NO_2$.** — B.p. abt. 280°. — Monoclin. lft.
60	49.4	**o-Iodnitrobenzene, $I.C_6H_4.NO_2$.** — ⟨*⟩ — B.p. 288–9° (729). — Flat *lemon-yel.* ndl. — E.s. warm alc.
65	56.5	**o-Iodaniline, $I.C_6H_4.NH_2$.** — ⟨**⟩ — Ndl. — E. vol. w. st. — Odor unpleasant. — V.d.s. c. aq.; e.s. org. solv. — $\bar{B}.HCl.H_2O$: pr.; decd. by aq.
70	55–6	**4-Iod-3-nitrotoluene, $I,(NO_2).C_6H_3.Me$.** — ⟨*⟩ — Flat *yel.* ndl. — E.s. h. alc.
75	55–6; 58	**Iodtrinitromethane, Iodpicrin, $CI(NO_2)_3$.** — ⟨*⟩ — B.p. 48° (13 mm.). — Colorless or light-yel. pr. or lft. — I. aq., s.h. alc., bz., lgr. — Dec. rapidly on keeping.
80	60.5–1	**4-Iod-2-nitrotoluene, $I,(NO_2).C_6H_3.Me$.** — B.p. 286° (much decn.). — Pale *yellowish* cryst. — E.s. eth., CS_2.
90	65d.	**Quinolineiodoform, $3C_9H_7N.CHI_3$.** — ⟨*⟩ — Clear cryst. — I. c. aq., ac., alk.; s. eth., bz. — E. decd. to components by alc.
95	72	**Quinoline Methyliodide, $C_9H_7N.MeI$.** — ⟨*⟩ — *S-yel.* cryst. fr. alc. — (W. Ag_2O gives corresp. unstable e.s. strong alk. HO-base.)
100	74.4	**4-Iod-1,2-dinitrobenzene, $I.C_6H_3(NO_2)_2$.** — ⟨*⟩ — Yel. tbl. fr. alc. — E.s. c. alc., chlf., eth. — (Heated w. alc.-NH_3 gives 5-iod-2-nitroaniline.)
105	75	**1^1-Iod-2-nitrotoluene, $CH_2I.C_6H_4.NO_2$.** — ⟨*⟩ — Rhomb. lft.
110	79	**4-Iod-dimethylaniline, $I.C_6H_4.NMe_2$.** — Cryst. — $\bar{B}_2.H_2PtCl_6$.
115	79	**o-Iodbenzaldehydephenylhydrazone, $I.C_6H_4.N_2H.Ph$.** — *Yel.* pr.
120	88.5	**4-Iod-1,3-dinitrobenzene, $I.C_6H_3(NO_2)_2$.** — ⟨*⟩ — *Yel.* lft. — V.d.s. c. alc. — Warmed w. dil. KOH sol. gives 2,4-dinitrophenol.
125	95	**Iodacetamide, $CH_2I.CO.NH_2$.** — ⟨*⟩ — Cryst. fr. aq. — E.s. h. aq.
130	95–6	**2,4-Diiodaniline, $I_2.C_6H_3.NH_2$.** — ⟨**⟩ — Ndl. — Salts decd. by aq.
135	103–4	**2-Iod-5-nitrotoluene, $I,(NO_2).C_6H_3.Me$.** — ⟨*⟩ — Mic. ndl. — Dichloride (fr. chlf. sol. + Cl): m.p. 102°, s. chlf.
140	105	**p-Iodazobenzene, $I.C_6H_4.N_2.Ph$.** — *Yel.-br.* ndl. fr. alc.
145	108–9	**3-Iod-x-nitrotoluene, $I,(NO_2).C_6H_3.Me$.** — Ndl.
150	109.5–10	**o-Iodacetanilide, $I.C_6H_4.NH.CO.Me$.** — Pr. or hexag. tbl. fr. alc. — Sbl. easily. — 100 pt. 95% alc. @ 11.5° dis. 13.92 pt.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND IODINE. — SOLIDS.
152	110–12	**Benzamide Iodide, $[\mathrm{C_6H_5.CO.NH_2I.}]_2$.** — ⟨*⟩ — Thin *olive-green* pr.; Luster, golden. — S.h. eth., chlf. — Boiled w. aq. or alc. dec. to benzamide (No. **2**.2051) & I.
155	112.5	**1,2-Diiod-nitrobenzene, $\mathrm{I_2.C_6H_3.NO_2}$.** — *Lemon-yel.* cryst. fr. alc.
160	113.7	**2-Iod-1,3-dinitrobenzene, $\mathrm{I.C_6H_3.(NO_2)_2}$.** — ⟨*⟩ — *Or.-yel.* tbl. fr. alc. — S. alc. — Heated w. alc.-$\mathrm{NH_3}$ gives 2,6-dinitraniline: m.p. 137.8°; No. **2**.3262.
165	117	**Pyridine Iodomethylate, $\mathrm{C_5H_5N.MeI}$.** — ⟨*⟩.
170	119.5	**m-Iodacetanilide, $\mathrm{I.C_6H_4.NH.CO.Me}$.** — Cryst. fr. alc. — 100 pt. 95% alc. @ 20.5° dis. 43.3 pt.
175	121	**p-Iodbenzaldehydephenylhydrazone, $\mathrm{I.C_6H_4.N_2HPh}$.** — Sm. *yel.* pr.
180	129	**Di-ioddiphenylamine, $\mathrm{(C_6H_4I)_2NH}$.** — Lft. fr. alc. + aq. — I. aq.; s. org. solvs.
185	135–40d.	**Benzonitrile Dihydroiodide, $\mathrm{PhCI_2.NH_2}$.** — ⟨*⟩ — *Lemon-yel.* cryst. — D.s. w. decn. in eth., bz.; more s. alc.
190	d. 143	**8-Oxyquinoline (Quinophenol) Iodomethylate, $\mathrm{HO.C_9H_6N.MeI.H_2O}$.** — *Lemon-yel.* ndl. fr. aq.
195	d.w.m. 140–50	**Iodol, Tetraiodpyrrole, $\mathrm{I_4.C_4NH}$.** — *Light yel.* mic. ndl. fr. dil. alc. — S. in 5000 pt. aq.; 100 pt. sol. in 90% alc. contains 5.8 pt. — E.s. alc., gl. ac. ac.; s. in 2 pt. eth. — Blackens on boiling w. HCl. — S. w. intense green color in oil of vit., slowly changing to dirty violet! — $\mathrm{HNO_3}$ turns alc. sol. intense red! — Odorless & less toxic than iodoform, wh. it resembles in physiological action. — (Pat.).
200	150	**3,3¹-Diiodazobenzene, $\mathrm{(I.C_6H_4\text{-})_2N_2}$.** — *Or.-red* ndl.
205	154–5	**2-Iod-4-nitrophenol, $\mathrm{I.(NO_2).C_6H_3.OH}$.** — ⟨**⟩ — *Yel.* ndl. — D.s. aq., alc. — Not vol. w. st.
210	155	**m-Iodbenzaldehydephenylhydrazone, $\mathrm{I.C_6H_4.N_2H.Ph}$.** — *Yel.* cryst.
215	156	**4-Iod-3-nitrophenol, $\mathrm{I(NO_2).C_6H_3.OH}$.** — ⟨**⟩ — *Yel.* ndl. fr. aq. — Long boiling w. alc.-KOH gives 3-nitrophenol — AgĀ: scarlet ppt. — EtĀ: m.p. 63.5°.
220	156.5	**2,6-Diiod-4-nitrophenol, $\mathrm{I_2(NO_2).C_6H_2(OH)}$.** — ⟨**⟩ — Colorless pr. fr. eth. — Alm. i. aq.; e.s. alc. — KĀ (@ 120°): red cryst. w. green reflect.
225	164.5	**2-Iod-1,3,5-trinitrobenzene, $\mathrm{I.C_6H_2.(NO_2)_3}$.** — ⟨*⟩ — *Yel.* ndl. — Pyr. fr. bz. — Boiled w. KOH sol. gives picric ac.; No. **2**.3168.
230	168.4	**2,4-Diiodnitrobenzene, $\mathrm{I_2.C_6H_3.NO_2}$.** — ⟨*⟩ — *Yel.* lft. — V.d.s. c. alc.; d.s. eth.
235	171.5	**p-Iodnitrobenzene, $\mathrm{I.C_6H_4.NO_2}$.** — ⟨*⟩ — *Pale yel.* ndl.
240	173–4	**Lepidine (Py-4-methylquinoline) Iodomethylate, $\mathrm{C_{10}H_9N.MeI}$.** — *Yel.* pr. fr. alc. — Oxid. in air.
245	175 (r.h.)	**Quinoxaline Iodomethylate, $\mathrm{C_8H_6N_2.MeI}$.** — *Yel.-red* lft. fr. alc. — E.s. aq.; mod. s. alc.
250	181.5; 183	**p-Iodacetanilide, $\mathrm{I.C_6H_4.NH.CO.Me}$.** — Rhomb. tbl. fr. aq. — Sbl. w. dif. — 100 pt. 95% alc. @ 20.5° dis. 6.4 pt.; e.s. gl. ac. ac.
252	184	**Diiodcarbazole, $\mathrm{(C_6H_3I)_2NH}$.** — *Yel.* lft. fr. gl. ac. ac. — I. aq.; s. org. solv.
255	185.5	**2,4,6-Triiodaniline, $\mathrm{I_3.C_6H_2.NH_2}$.** — ⟨**⟩ — Ndl. — S. h., alm. i. c. alc.
260	190d.	**Hexamethylenetetramine Iodomethylate, $\mathrm{C_6H_{12}N_4.MeI}$.** — Silky ndl. — E.s. aq.; v.d.s. alc.; i. eth., chlf. — Boiled w. dil. $\mathrm{H_2SO_4}$ gives $\mathrm{NH_3}$.
265	195	**Quinaldine (Py-2-methylquinoline) Iodomethylate, $\mathrm{C_{10}H_9N.MeI}$.** — Long *lemon-yel.* ndl. fr. alc. — E.s. aq.; i. eth.
270	199	**6-Aminoquinoline Iodomethylate, $\mathrm{C_9H_8N_2.MeI}$.** — V.s. aq., alc.
275	202	**Phenanthridine Iodomethylate, $\ulcorner\mathrm{C_6H_4.C_6H_4N : CH}\urcorner\mathrm{.MeI}$.** — Thick *yel.* pr. fr. alc. — NaOH sep. corresp. ammon. hydroxide: ndl.; m.p. 109°; i. aq.; s. alc. w. violet fluor.
277	208	**Hydrastine Iodomethylate, $\mathrm{C_{21}H_{21}O_6N.MeI}$.** — Ndl.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND IODINE. — SOLIDS.
280	214d.	**Hexamethyldiaminodiphenylmethane Iodide, $CH_2.(C_6H_4NMe_2)_2(MeI)_2$.** — *Yel.* lft. — Turns green @ 193°. — E.s. h. aq., alc.; i. eth.
285	216	**Nicotine Diiodomethylate, $C_{10}H_{14}N_2.(MeI)_2$.** — V.d.s. aq.; i. eth. — Ag_2O gives caustic odorless base.
290	221	**Py-3-(β)-methylquinoline Iodomethylate, $C_{10}H_9N.MeI$.** — Long *lemon-yel.* ndl. fr. abs. alc.
295	218–22; 231	**Tetramethyldiaminotriphenylmethane Iodomethylate, $C_{23}H_{26}N_2(MeI)_2$.** —Lft. or 6-sided tbl. fr. aq. — S. aq. — Dec. to MeI & leucomalachite green in melting.
300	224	**2-Methylpyridine Iodomethylate, $C_6H_7N.MeI$.** — Ndl. fr. alc.
305	224	**4-Aminoquinoline Iodomethylate, $C_9H_8N_2.MeI$.** — Ndl. fr. abs. alc.
310	237	**4,4[1]-Diiodazobenzene,** $(I.C_6H_4\text{-})_2N_2$. — *Reddish* scales
315	247	**2-Aminoquinoline Iodomethylate, $NH_2\ C_9H_6N.MeI$.** — Pr. — E.s. h. aq., alc.
320	265	**Pentamethyl-p-phenylenediamine Iodide, $C_6H_4(NMe_2)_2.MeI$.** — Lft. — (Fr. tetramethyl-p-phenylenediamine & MeI).

ANALYTICAL TABLES
OF
ORDER LII

COMPOUNDS CONTAINING NITROGEN AND IODINE AS "ADDITIONAL ELEMENTS"

DIVISION B, LIQUID SPECIES.

No.	Boiling-point (C.°)	Specific Gravity	SPECIFIC NAMES. — Tests and Specific Characterizations.
400	182–4d.	2.306	**Iodacetonitrile, $CH_2I.CN$.** — (*) — Odor powerful. — Slowly s. c. aq. w. saponification.

CHAPTER X

ORDER LIV

COMPOUNDS CONTAINING NITROGEN AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

[The typographical sign *, ‡, §, or **, standing before the capital letter designating one of the following "General Observations," is the equivalent for that letter in all references to these Observations made in the "Analytical Tables" of Order LIV.]

(A) **Color** (T. **4**.1). — Although a majority of the tabulated species of Order LIV are colorless the descriptions include numerous yellow compounds along with a very few that are red and orange.

(B) **Divisions.** — Order LIV contains a Division A for solids and a Division B for liquids. Neither division is subdivided into sections.

(C) **Odor.** — While many species have a mild aromatic odor, or are odorless, there are many others, like the volatile mustard oils, which are distinguished by their characteristic irritating, pungent, or alliaceous odors, rendering odor in this chapter a very useful preliminary test.

(D) **Sulphates and other Salts of Nitrogen-bases.** — Read the "Remark on Organic Salts in the Higher Orders" on page 3, and always apply the tests there mentioned in paragraphs (**a**) and (**b**) for ammonium salts and sulphates.

(E) **Acidity** (T. **4**.3). — The order is chiefly composed of "neutral" species, but contains some strong acids and a few weak bases.

⟨*⟩ (F) **Alkali-fusion** (T. **4**.8). — This fusion should be usually applied to non-volatile or very difficultly volatile solid compounds, since it is very useful in distinguishing between species which yield alkali *sulphite*, like the sulphonic acids, sulphones and sulphonamides; and those like the polysulphides, thioureas, and dithiocarbamates which give alkali *sulphide*.

(G) **Compounds giving Carbon Disulphide in** T. **4**.9 **with Sulphuric Acid.** — Compounds which yield alkali sulphite in the alkali-fusion (G.O.-F) and which it is moreover suspected may be of the dithiocarbamate or xanthate types, should be examined by this procedure.

⟨‡⟩ (H) **Isothiocyanate Esters.** (**"Mustard Oils"**). — Cf. T. **4**.14.

⟨§⟩ (I) **Thioureas.** — Thioureas when refluxed with an alcoholic suspension of yellow mercuric oxide (prepared as described under **54**.1180) usually give the corresponding simple urea. They give alkali sulphide in T. **4**.8 on fusion with alkali, but no carbon disulphide with sulphuric acid in T. **4**.9. Monosubstituted thioureas when melted for a minute or two, or heated to 160° when melting at lower temperatures, give aqueous solutions that are colored blood-red by ferric chloride, while longer heating may yield much of the corresponding symetrical disubstituted thioureas.

(**) (K) **Sulphonamides.** — Cf. T. 4.12.

(L) **Miscellaneous Types.**

Alkyl Thiocyanates. — Odor, not pungent like the isothiocyanates, but mildly alliaceous. High temperature usually isomerizes to isothiocyanates.

Thiocarbamate Esters boiled with alcoholic sodium hydroxide solution decompose according to the equation $NH_2.CS.OR + NaOH = NaSCN + H_2O + ROH$.

Thionylamines (*R.NSO*) are very easily decomposed by alkali solution, or even hot water, forming amine and alkali sulphite or sulphurous acid.

Thiuram Disulphides ($R_2N.CS.S_2.CS.NR_2$). — Cf. T. 4.9 d & e.

ANALYTICAL TABLES

OF

ORDER LIV

COMPOUNDS CONTAINING NITROGEN AND SULPHUR AS "ADDITIONAL ELEMENTS"

DIVISION A, SOLID SPECIES.

No.	Meting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	26	**o-Aminothiophenol, $NH_2.C_6H_4.SH$.** — B.p. 234°. — Ndl. — S. acids or caustic alk. (not in alk. carbonates). — E. oxid. by air (or better by $FeCl_3$ in weak HCl sol) to $(NH_2.C_6H_4)_2S_2$, No. **54**.460: lft. fr. h. alc.; m.p. 93°.
55	26	**p-Tolylmustard Oil, C_7H_7NCS.** — ⟨‡⟩ — B.p. 237°. — Ndl. fr. eth.
57	26	**Benzenesulphonylisopropylamine, $PhSO_2.NHPr$.** — ⟨**⟩ — E.s. aq.-NaOH sol.
60	28–29	**Thioformamide, $HSC.NH_2$ or $HC(SH):NH$.** — Unstable, changing to yellow syrupy mass. — Colorless cryst. fr. eth. + pet. eth. — Yellow when molten. — S. aq. (sol. yellow); v.s. alc.; s. eth.; i. c. chlf., bz., lgr., CS_2. — Red. Fehling's sol. — Boiling w. aq. evolves H_2S. — W. $AgNO_3$ gives Ag_2S. — Taste, v. bitter.
65	28.5	**Dimethyl-p-aminothiophenol, $NMe_2.C_6H_4.SH$.** — B.p. 259–60° d. — Oxid. quickly in air to dithiodimethylaniline, No. **54**.820.
70	33	**Thionyl-α-naphthylamine, $C_{10}H_7N:SO$.** — B.p. 226° (100 mm.). — *Red-yel.* ndl. — E.s. abs. alc., eth., lgr., bz. — (Fr. $SOCl_2$ & α-naphthylamine).
75	34	**Methyl Isothiocyanate (Methyl Mustard Oil), MeNCS** —⟨‡⟩ — B.p. 119°. — Sp. gr. 1.069 (37/4). — Cryst. w. horse raddish-like odor! — Ammon. $AgNO_3$ ppts. AgS. — Evapd. w. conc. NH_3 sol. gives methylthiourea: pr.; m.p. 118°; c.s. aq., alc.; d.s. eth.; No. **4**.825.
80	35	**o-Phenylenediazo-sulphide, $\ulcorner C_6H_4.N : N.S \urcorner$.** — B.p. 129° (10 mm.). — Odor aromat. — Tbl. fr. lgr. — Vol. w. st. — E.s. alc., eth., bz., lgr.; i. dil. acids.; s. conc HCl. — (Not at. by KOH sol. @ 150°.) — At 200–250° dec. to N_2 & diphenylene disulphide, No. **7**.1040. — (Fr. aminothiophenol & HNO_2).
85	36	**Benzenesulphonylpropylamine, $Ph.SO_2.NH.C_3H_7$.** — ⟨**⟩ — Cryst. — E.s. alc., eth., bz., conc. NaOH sol.
87	38	**Ethyl Thiocarbamate, "Xanthogenamide", $NH_2.CS.OEt$.** — ⟨G.O.-L.⟩ — Monoclin. pyr. — R.d.s. aq.; misc. alc., eth. — Alc.-KOH gives KSCN & EtOH.
90	40	**s-Dihexylthiourea, $CS.(NH.C_6H_{13})_2$.** — ⟨§⟩ — Lust. lft. fr. alc.
95	41; 36–8	**Benzyl Thiocyanate, $Ph.CH_2.SCN$.** — B.p. 230–5°, 256°. — Pr. — Odor pungent. — I. aq.; e.s. alc., eth. — Oxidn. w. HNO_3 gives benzoic ac., Vol. I.
100	42	**Benzenesulphonyldiethylamide, $Ph.SO_2.NEt_2$.** — ⟨**⟩ — Large cryst. fr. alc.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
105	43	**Thialdin, ⌜NH.CHMe.S.CHMe.S.CHMe⌝.** — Monoclin. cryst. — Vol. w. st. — V.d.s. aq.; e.s. alc., eth. — Boiled w. $AgNO_3$ sol. gives Ag_2S, etc. — "Reacts neut.", but forms cryst. salts w. acids. — 1 mol. base disd. in 1 mol. 3% HCl added to x.s. conc. KSCN sol. gives $\bar{B}$.CNSH: long ndl.; alm. i. c. aq.; m.p. 132° d.
107	43	**Methyl Thiocarbamate, $NH_2.CS.OMe$.** — ⟨G.O.-L⟩
110	44	**Nitrothiophene, $C_4H_3S.NO_2$.** — B.p. 224–5° c. — Odor & appearance like nitrobenzene! — Monoclin. cryst. — I. alk. — Gradually reddens in air. — E.s. fuming sulph. ac. to sulphonic ac. wh. becomes fuchsine-red w. am. sulphide.
115	44	**Piazthiole, $C_6H_4{:}N_2{:}S$.** — B.p. 206°. — Odor very strong! — D.s. h. aq.; e.s. alc., etc. — Not at. by CrO_3 mixt. — "V. weak base." — H_2S & Sn (& HCl) give o-phenylenediamine, No. **2**.751. — (Fr. o-phenylenediamine & SO_2). — (Pat. Frdl. II, 534).
120	46	**N-Thionylpiperidine, $(C_5H_{10}N)_2SO$.** — ⟨G.O.-L.⟩ — Lft. fr. eth. — E.s. eth., lgr. — Acids dec. to piperidine (No. **2**.106) & SO_2. — Oxid. by air to $C_5H_{11}NSO_2$: deliq. ndl.; m.p. 70°. — (Fr. piperidine & $SOCl_2$).
125	47–8	**Benzenesulphonyldimethylamine, $Ph.SO_2.NMe_2$.** — ⟨**⟩ — Cryst. — I. c. aq.; d.s. h. lgr.
130	51.5; 51.8	**Phenyl-β-naphthyl Sulphide, $Ph.S.C_{10}H_7$.** — B.p. 224° (14 mm.). — Cryst. fr. alc.
135	52	**α-Dinitrothiophene, $C_4H_2S(NO_2)_2$.** — B.p. 290°. — *Yel.* lft. fr. alc. — D.s. h. aq. — *One* drop alc.-KOH gives dark red ppt. in alc. sol. — X.s. KOH destroys the color! — Repeated distn. w. st. changes to β-deriv.: m.p. 75–6°.
140	53	**m-Phenylenemustard Oil, $C_6H_4(NCS)_2$.** — ⟨‡⟩ — B.p. a. 250° d. — Ndl. — E.s. alc.
145	53	**Thionyl-β-naphthylamine, $C_{10}H_7N{:}SO$.** — *Yel.* ndl. fr. lgr. — (Fr. $SOCl_2$ & α-naphthylamine).
150	53	**Benzenesulphonylisobutylamine, $Ph.SO_2.NH.CH_2.CHMe_2$.** — ⟨**⟩ — I. aq; e.s. alk., alc., eth., bz.
155	54d.	**p-Toluidine Tolyldithiocarbamate, $C_7H_7NH.CS.S.NH_3.C_7H_7$.** — ⟨G.O.-G.⟩ — Alc. dec. w. sepn. of S. — (In air changes to di-p-tolylthiourea, No. **54**.1440.)
160	56	**2,4-Toluylenemustard Oil, $Me.C_6H_3(NCS)_2$.** — ⟨‡⟩ — B.p. abt. 300° sl.d.
165	57	**Propylbenzene-3-sulphonamide, $Et.CH_2.C_6H_4.SO_2NH_2$.** — ⟨**⟩.
170	57–8	**α-Pyridyl Disulphide, $(NC_5H_4S\text{-})_2$.** — Ndl. fr. lgr. — E.s. except in aq. & lgr. — $\bar{B}$.Pk: cryst. ppt. fr. alc.; m.p. 119°. — $\bar{B}_2.H_2PtCl_6$: red-yel. cryst. ppt.; m.p. 150°.
175	58	**Ethanesulphonamide, $Et.SO_2.NH_2$.** — ⟨**⟩ — Lust. pr. fr. eth. — (Corresp. stable acid: no m.p.)
185	58; 53	**α-Naphthyl Isothiocyanate, $C_{10}H_7N.C{:}S$.** — ⟨‡⟩ — Lust. ndl. fr. alc. — E.s. h. alc., eth., bz. — (Combines w. aniline).
190	59	**o-Phenylenemustard Oil, $C_6H_4(NCS)_2$.** — ⟨‡⟩ — Ndl. or lft. — V.s. chlf., lgr. etc.
195	59	**Benzenesulphonylethylamine, $Ph.SO_2.NHEt$.** — ⟨**⟩ — Clear cryst. fr. alc. — S. in x.s. conc. NaOH sol.
200	59–60	**Dithiodiphenylamine, ⌜$NH.C_6H_4.S.S.C_6H_4$⌝.** — Ndl. fr. bz. — I. aq.; d.s. alc., eth., bz. — Heated w. Cu powd. gives diphenylamine, No. **2**.1568.
205	60	**Cyanogen Sulphide, $(CN)_2S$.** — Tbl. or lft. — Sbl. fr. 30°–40°. — Odor like cyanogen iodide. — E.s. aq., eth., CS_2; s. chlf., bz., conc. H_2SO_4. — Decd. by conc. HCl. — Separates I fr. KI. — Alc.-KOH gives KOCN & KSCN.
210	d.60	**m-Diazobenzenesulphonic Ac., $C_6H_4N_2SO_3$ = ⌜$N : N.C_6H_4.SO_3$⌝.** — Sm. red-yel. pr. fr. aq. — E.s. aq. — Dry acid deflag. viol. on heating.
215	60	**Ethyl Phenyldithiocarbamate, PhNH.CS.SEt.** — ⟨G.O.-G.⟩ — Tbl. fr. alc. — I. aq., dil. ac.; v.s. alc., eth., bz.; s. alk. — Heated w. aniline gives ethyl-

No.	Melting-point (C.°)	“ADDITIONAL ELEMENTS” — NITROGEN AND SULPHUR. — SOLIDS.
		mercaptan & thiocarbanilide. Heated alone gives mercaptan & phenylmustard oil, No. **54**.2225.
220	60.5	**m-Nitrophenyl Isothiocyanate, $NO_2.C_6H_4.N:CS$.** — ⟨‡⟩ — B.p. 275–80° sl. d. — Ndl. fr. gl. ac. ac. — (Odor pungent only when warmed). — Alm. i. aq.; e.s. alc., eth., CS_2, bz. — H_2S passed in alc. sol. gives m-nitraniline (No. **2**.3125): ndl.; d.s. aq.; m.p. 114°.
225	61; 51.5	**s-Dimethylthiourea, $(MeNH)_2CS$** — ⟨§⟩ — Deliq. tbl. — V.s. aq., alc., chlf.; r.d.s. eth., CS_2, bz.; v.d.s. lgr.
227	60–2	**Ethenylaminothiocumenol, ⌜$C_6HMe_3.S.CMe : N$⌝.** — Silky ndl. fr. dil. alc. — E.s. alc., eth.
230	62–3	**β-Naphthyl Isothiocyanate, $C_{10}H_7N.C:S$.** — ⟨‡⟩ — Yellowish ndl. fr. alc. — V.s. eth., h. alc.
232	63	**Ethyl Thioxamate, $NH_2.CS.CO_2Et$.** — *Lemon-yel.* pr. — E.s. h. aq., alc., eth. — Long boiling w. aq. separates S. — (Fr. H_2S & ethyl cyanoformate.)
235	64	**N-Dithiodipiperidine, $C_5H_{10}N.S.S.NC_5H_{10}$.** — White lft. of penetrating odor fr. alc. — Stable towards h. aq. — Acids dec. w. sepn. of S & SO_2.
240	65	**Ethyl Azobenzenexanthate, $Ph.N_2.C_6H_4S.CS.OEt$.** — *Vermilion-red* cryst. fr. lgr.! — Alc.-KOH gives azobenzenedisulphide, No. **54**.1300, (J. pr. [2] **41**,210).
245	60–70; 108d.	**Ammonium Phenyldithiocarbamate, $PhNH.CS.S.NH_4$.** — ⟨G.O.-G.⟩ — *S-yel.* pr. — D.s. alc. — Gives thiocarbanilide, No. **54**.1180, on heating above m.p. — Aq. sol. gives black ppt. w. $CuSO_4$ sol., wh. becomes yellow on warming. — (The corresp. free acid dec. at once to CS_2, H_2S & thiocarbanilide.)
250	67–8	**a,b-Methylethylphenylthiourea, MeNH.CS.NEtPh.** — ⟨§⟩ — Clear rhombohedra fr. alc. — V.s. alc. — Boiled w. aniline gives thiocarbanilide, methylaniline & methylamine.
255	70	**Thionyl Cyanide, $SO(CN)_2$.** — Sbl. — Vapor provokes tears! — I. aq.; s. alc.; e.s. eth. — Boiled w. aq. or alk. gives HCN & SO_2!
260	70	**Tetraethylthiuram Disulphide, $[NEt_2.CS]_2S_2$.** — ⟨G.O.-L⟩ — Cryst. — I. aq.; e.s. h. alc.; less s. c. alc., eth. — (Little at. by NaOH sol.). — (Fusion w. NaOH gives Et_2NH.)
265	71; 68	**3-Dipropylthiourea, $CS.(NHPr)_2$** — ⟨§⟩ — Pearly lft. fr. aq. — D.s.c. aq.
270	71	**p-Nitrobenzylsulphonic Ac, $NO_2.C_6H_4.CH_2.SO_3H$.** — ⟨T. **4**.3⟩ — N. Eq. 217. — Ndl. — (Pat. fr. nitrobenzyl chloride). — Amide: m.p. 204°.
275	71–72; 68–9	**Phenylthiourethane, Ethyl Anilinothiocarbonate, $C_6H_5NH.CS.OEt$.** — Triclin. cryst. (fr. phenylmustard oil & alc.). — S. in alk., repptd. by ac.; i. Na_2CO_3 sol. — Distn. partly dec. to alc. & phenylmustard oil, No. **54**.2225, (odor!). — Alc. sol. dis. HgO giving $Hg\bar{A}_2$: tbl.; m.p. 78°.
280	72	**p-Thionylaminodimethylaniline, $Me_2N.C_6H_4.NSO$.** — *Dark red* cryst. w. greenish reflec. fr. bz. + pet. eth.! — Odor agreeably aromat. — Decd. by h. aq., alk., or ac. — Sl. oxid. in air.
285	72	**Dithiodiethylaniline, $S_2[C_6H_4NEt_2]_2$.** — Lust. pr. fr. alc. — D.s. c. alc., bz., lgr., warm eth. — (Salts decd. by aq.). — B̄.Pk: amorph. yel. powd.; s.h. alc., bz.
287	72–3	**s-Diisoamylthiourea, $NH_2.CS.NH(C_5H_{11})$.** — ⟨§⟩ — Lust. pr. fr. alc.
290	73	**1,3-Methylisopropylbenzene-6-sulphonamide, $Me,C_3H_7.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Lust. lft. fr. aq. — D.s. h. aq.; s. lgr. — Corresp. ac.: m.p. 88°.
295	74	**m-Nitrobenzylsulphonic Ac., $NO_2.C_6H_4.SO_3H + H_2O$.** — ⟨T. **4**.3-b⟩ — N. Eq. 221. — Loses cryst. aq. @▌120–30°. — Chloride: cryst.; m.p. 100°. — Amide: cryst.; e.s. h. aq.; m.p. abt. 159° d.
300	74	**N-Thiopiperidine, $C_5H_{10}N.S.NC_5H_{10}$.** — Odor peculiar, sl. sharp. — Long clear pr. fr. h. alc. — I. aq.; e.s. eth., h. alc.; less s. c. alc. — Dis. clear in dil. HCl, decg. w. sepn. of S & SO_2 on standing. — Pptd. unchanged by alk. fr. fresh c. sol. — “Not at. on heating in dil. alk.” — B̄.H_2PtCl_6: choc. brown ppt. fr. hot alc. sol. of components, Ber. **28**, 1014. — B̄.2Pk: gold-yel. ndl.; m.p. 144–5°.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
305	75	**Thioacetanilide, Me.CS.NHPh.** — Ndl. fr. aq. — An acid; s. in alk. & repptd. unchanged by acids!
310	75–6	**β-Dinitrothiophene, $C_4H_2S(NO_2)_2$.** — Vol. w. st. — Long *yel.* lust. ndl. fr. alc. — Somewhat sol. aq.
315	75.5	**s-Diethyldiphenylthiourea, EtPhN.CS.NEtPh.** — ⟨§⟩ — Tbl. fr. lgr. — (I. alk.).
320	77	**p-Nitrothiophenol, $NO_2.C_6H_4.SH$.** — Cryst. fr. eth. or chlf. — E.s. h. aq. or alc.; v.s. eth., chlf.; d.s. h. lgr.
325	77	**s-Diethylthiourea, $CS.(NH.Et)_2$.** — ⟨§⟩ — Cryst. — S. aq. — Distn. w. P_2O_5 gives ethylamine & ethylmustard oil. — W. HgO gives s-diethylurea.
330	78	**s-Dimethylsulphamide, $SO_2(NHMe)_2$.** — Pr. — Tastes sweet. — E.s. aq., alc.; alm. i. lgr. — Stable w. boiling aq.
335	78	**2-Diazothio-s-dimethylaniline, ⌜$C_6H_3(NMe_2).N:N.S$⌝.** — Ndl. by pptn. of bz. sol. by lgr. — D.s. aq., lgr.; v.s. alc., eth., chlf., bz.
340	78.4	**Allylthiourea, Thiosinamin, $C_3H_5NH.CS.NH_2$.** — ⟨§⟩ — Cryst. — Mod. s. aq.; e.s. alc., eth.; i. bz. — (Fr. ammon. + mustard oil. Used in photography.) — Taste bitter. — Gives ppt. w. ammon. $AgNO_3$.
345	79	**n-Butylthiourea, $NH_2.CS.NHBu$.** — ⟨§⟩ — Cryst.
350	79	**Benzenesulphonylmethylphenetidine, $EtO.C_6H_4.NMe.SO_2.Ph$.** — ⟨**⟩ — Tbl. fr. eth.
355	79.5–80; 83	**Thiodiethylaniline, $(NEt_2.C_6H_4)_2S$.** — Ndl. fr. alc. — I. aq.; d.s. c. alc.; e.s. h. alc., eth., bz. — $\bar{B}.H_2PtCl_6$ (@ 100°): yel. floc. ppt. — $\bar{B}$.2Pk: fine S-yel. ndl. fr. h. alc.; m.p. 175°, 177°; d.s. alc., eth.
365	81–2	**uns-Dimethylthiourea, $Me_2N.CS.NH_2$.** — ⟨§⟩ — Deliq. pr.
370	81–2	**p-Diaminophenyl Disulphide, Pseudo-dithioaniline, $[NH_2.C_6H_4]_2S_2$.** — Greenish ndl. fr. much boiling aq. — E.s. alc., eth., chlf.; d.s. c. bz., CS_2, lgr. — $\bar{B}$.2HCl: ndl.
375	82	**Dimethylaminodiphenylsulphone, $Me_2N.C_6H_4.SO_2.Ph$.** — ⟨*⟩ — Ndl. fr. alc. — I. aq.; e.s. alc., eth., bz. — Zn & H_2SO_4 splits to dimethylaniline & thiophenol, No. **7**.1620.
380	82	**α-Naphthalenesulphonic-α-naphthalide, $C_{10}H_7SO_2.NH.C_{10}H_7$.** — ⟨**⟩ — Sm. ndl.
385	83	**m-Dinitrophenyl Disulphide, $(NO_2C_6H_4)_2S_2$.** — *Yel.* cryst. fr. alc. — E.s. eth. — (Skin irritant).
390	83	**Hexylthiourea, $NH_2.CS.NH(C_6H_{13})$.** — ⟨§⟩ — Fatty lft. fr. alc.
395	84	**Phenetole-p-sulphonamide, $EtO.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Ndl. fr. dil. alc.
400	85–6	**Thio-o-benzotoluide, $PhCS.NH.C_6H_4.Me$.** — *S.-yel.* 6-sided pr. fr. bz.
405	85–6	**m-Ethylbenzenesulphonamide, $Et.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Lust. lft.
410	86d.	**p-Nitrophenyldiazomercaptanhydrosulphide, $NO_2.C_6H_4.N_2SH + H_2S$.** — Lust. *ponceau-red* ndl. of met. lust. fr. acetone & aq. — E.s. acetone, alc., eth., bz., chlf. — S. ammon. w. deep red color. — (Fr. diazotized p-nitraniline & H_2S).
415	87; 84	**Carbonylthiocarbanilide, ⌜S.C(: NPh).NPh.CO⌝.** — Glassy pr. fr. eth. — V.s. eth., bz., CS_2; less s.c. alc.; i. aq. — Boiled w. aq., alk., or ac. gives carbanilide, No. **2**.2580, CO_2 & H_2S.
420	87	**Methyldiphenylthiourea, MePhN.CS.NHPh.** — ⟨§⟩ — B.p. 204–6°. — Glassy cryst. fr. alc. — I. aq.; d.s. c. alc., lgr.; e.s. eth., chlf., bz., h. alc. — Boiling w. aq. gives phenylmustard oil, No. **54**.2225, & methylaniline. — (Fr. phenylmustard oil & methylaniline).
424	87–90d.	**Cyanthioformamide, "Flaveanwasserstoff," $NH_2.CS.CN$.** — *Yel.* ndl. fr. chlf. — S. aq. — V. unstable. — Conc. KOH sol. dec. to sulphide, cyanide & sulphocyanide. — Ag sol. gives Ag_2S & cyanogen at once! — (Fr. H_2S & C_2N_2).
425	Deflag. at 89	**Bis-p-nitrophenyldiazosulphide, $(NO_2.C_6H_4.N_2)_2S$.** — *S.-yel.* ndl. fr. dil. acetone. — V. explosive when dry. — I. aq., c. ammon.; r.d.s. alc. —

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
		Acetone sol. colored intense violet-red by little NaOH sol.! — (Fr. H_2S & nearly neut. sol. of diazotized p-nitraniline).
435	89	**Ethyl-a,b-diphenylthiourea, EtPhN.CS.NHPh.** — ⟨§⟩ — Boiled w. aniline gives thiocarbanilide, No. **54**.1180, & ethylaniline, No. **2**.1270.
440	90	**Ethylene Thiocyanate, $C_2H_4(SCN)_2$.** — Rhomb. tbl. — Vapor provokes tears & sneezing. — D.s.c. aq., more s. h. — Alc.-KOH gives $(C_2H_4S_2)_2$.
445	90–2	**Nitrosulphobenzid, $NO_2.C_6H_4.SO_2.Ph$.** — Mic. cryst. — Dec. @ 250°. — E.s. eth., h. alc.
450	93.5; 87–8	**Methyl Phenyldithiocarbamate, PhNH.CS.SMe.** — ⟨G.O.-G.⟩ — Cryst. fr. alc. — Heated w. alk. gives aniline & methylmercaptan (odor). — Aniline gives thiocarbanilide, No. **54**.1180, & methylmercaptan, No. **7**.1350.
455	92–3	**Dibenzenesulphon-o-phenylenediamine, $C_6H_4(NH.SO_2Ph)_2$.** — ⟨*⟩ — Fine ndl. fr. gl. ac.ac. — (Fr. o-phenylenediamine, NaOH & benzenesulphonyl chloride).
460	93	**o-Diaminophenyl Disulphide, $[NH_2.C_6H_4]S_2$.** — Lft. — I. aq.; e.s. h. alc. — H_2S passed into h. HCl sol. ppts. S.
462	93	**Isoamylthiourea, $NH_2.CS.NH(C_5H_{11})$.** — ⟨§⟩ — Monoclin. cryst.
463	93.5	**Isobutylthiourea.** — ⟨§⟩ — Cryst.
465	93–4	**Isopropylbenzene-2-sulphonamide, $Me_2.CH.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Lust. ndl. — D.s. aq.; e.s. alc., eth.
470	95	**m-Nitrobenzenesulphinic Ac., $NO_2.C_6H_4.SO_2H$.** — Long silky ndl. — E.s. alc., eth. — Oxid. in air. — W. phenol & conc. H_2SO_4 gives blue color! — Ag$\bar{A}$: silky ndl.; v.d.s. c. aq.
475	95	**Ethenylaminothionaphthol, $\ulcorner CMe.S.C_{10}H_6.N \urcorner$.** — Pr. fr. alc. — V.s. alc. — (By heating S & *α*-acetnaphthalide.)
480	95–6	**1,3-Dimethylbenzene-2-sulphonamide, $Me_2.C_6H_3.SO_2NH_2$.** — ⟨**⟩.
485	94–6	**Thioformyl-o-toluide, $C_7H_7.NH.CHS$.** — *Yel.* ndl. fr. alc. — S. alc., eth. — Distn. gives H_2S, CS_2, etc. — H. conc. NaOH saponif. to o-toluidine, No. **2**.1262, & formic ac.
490	95	**Anisylthiourea, $MeO.C_6H_4.CH_2.NH.CS.NH_2$.** — ⟨§⟩ — Ndl. fr. alc. — E.s. alc.
495	95–6; 97	**Methyl Anilinothiocarbonate, $C_6H_5NH.CS.OMe$.** — Triclin. cryst. fr. alc. — (Fr. phenylmustard oil & MeOH). — I. aq.; e.s. alc., eth., chlf. — Boiled w. HgO in alc. gives carbanilide, No. **2**.2580.
500	96–7	**β-Naphthylthiourethane, $C_{10}H_7.NH.CS.OEt$.** — V.s. chlf.; s. alc., eth., bz., alk. — Ammon. $AgNO_3$ gives cheesy ppt. of $AgC_{13}H_{12}NSO$ fr. alc. sol.
505	96.5	**Benzenesulphonylhexylamine, $Ph.SO_2NH.C_6H_{13}$.** — ⟨**⟩ — Plates fr. dil. alc. — I. aq.; e.s. alc., eth., bz.; v. little s. conc. aq.-alk.
510	96–7d.	**Phenylhydrazine Phenyldithiocarbazinate, $Ph.N_2H_2.CS.S.N_2H_4.Ph$.** — ⟨G.O.-G.⟩ — 6-sided cryst. fr. eth. — Melts w. sl. gas evol. — D.s. eth., CS_2; e.s. w. acetone. — (Fr. CS_2 & eth. sol. of phenylhydrazine).
520	95–8	**Methyl Thiocarbamate, $NH_2.CO.SMe$.** — Monoclin. pr. fr. eth. — E.s. eth.; less s. alc., h. aq. — Heated w. alc. ammon. dec. to methylmercaptan, No. **7**.1350, & urea, No. **2**.2092.
525	96–8	**4,4¹-Diaminodibenzyl Disulphide, $[NH_2.C_6H_4.CH_2.S]_2$.** — (Pat., Frdl. **4**, 1056). — Cryst. fr. alc. — $\bar{B}$.2HCl : mic. lft. pptd. fr. aq. sol. by HCl gas. — Diacetyl deriv.: m.p. 173–4°.
530	97	**s-Benzenesulphaminovalerianic Ac., $Ph.SO_2.NH.CH_2.(CH_2)_3.CO_2H$.** — ⟨T. **4**.3⟩ — Pearly lft. fr. aq. — 100 pt. boiling aq. dis. 5.8 pt. — E.s. alc., eth., lgr.; d.s. chlf., bz.
535	97; 99–100	**o-Ethylbenzenesulphonamide, $Et.C_6H_4.SO_2.NH_2$.** — ⟨**⟩ — Ndl. — (Corresp. chloride: oily.)
540	98	**Allylphenylthiourea, $C_3H_5NH.CS.NHPh$.** — ⟨§⟩ — Cryst. — Satd. alc. sol. @ 46° contains 41.5%. — I. aq.; e.s. eth.
545	97.5–8.5	**Thiobenzanilide, PhCS.NHPh.** — Thin *yel.* cryst. fr. alc. — Alm. i. h. aq.;

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR — SOLIDS.
		e.s. dil. KOH sol. & repptd. by ac.; e.s. alc., eth. — Heated w. HCl gives $\mathrm{H_2S}$ & benzoic ac. (T. **1**.312).
550	97.5–8	**Phenylaceticthionamide, $\mathrm{Ph.CH_2.CS.NH_2}$.** — Cryst. fr. alc. — D.s. h. aq.; e.s. alc., eth. — Distn. dec. to $\mathrm{H_2S}$ & benzyl cyanide, No. **2**.2816. — Split by dil. HCl to $\mathrm{NH_3}$, $\mathrm{H_2S}$ & α-toluic ac. (Vol. I).
555	99	**Benzenesulphonic-3-nitro-p-toluide, $\mathrm{PhSO_2.NH.C_6H_3.(NO_2)Me}$.** — Cubes fr. alc. — E.s. alc., gl. ac. ac.; v.s. bz.; d.s. lgr. — ("Not decd. by alc.-KOH.")
560	99.3	**Methylthiodiphenylamine, $\mathrm{MeN.(C_6H_4)_2.S}$.** — Pr. fr. alc. — Dist. alm. undecd. 360–65°. — D.s.c. alc.; e.s. bz.; s. oil of vit. w. red-br. color. — Heated w. Cu powd. gives carbazole, No. **2**.2584.
563	93	**Sulphopiperid, $\mathrm{SO_2(NC_5H_{10})}$.** — B.p. 230°. — Lust. lft. fr. dil. alc. — E.s. alc., eth., bz.; d.s. aq. — (Fr. piperidine. & sulphuryl chloride). — Conc. HCl @ 200° splits to piperidine, No. **2**.1112, & $\mathrm{H_2SO_4}$.
565	99.5	**a,b-Ethylphenylthiourea, EtNH.CS.NHPh.** — ⟨§⟩ — Cryst. — Boiled w. aniline gives thiocarbanilide & ethylamine. — Conc. HCl @ 200° gives $\mathrm{EtNH_2}$ (No. **2**.1062), $\mathrm{PhNH_2}$ (No. **2**.1235), $\mathrm{CO_2}$ & $\mathrm{H_2S}$.
570	abt. 100d. with gas evol.	**Benzenesulphonenitramide, $\mathrm{PhSO_2.NH.NO_2}$.** — ⟨T. **4**.3-a⟩ — Tbl. fr. abs. alc. — V.s. aq., alc., eth. — KĀ: pr.; v.d.s. c. aq.
575	100	**1,3,5-Trinitrobenzene-2-sulphonic Ac., Picrylsulphonic Ac., $\mathrm{(NO_2)_3.C_6H_2.SO_3H}$.** — ⟨T. **4**.3-b⟩ — N. Eq. 293. — Cryst. — Solidif. above m.p., remelting abt. 185°. — E.s. aq., alc., eth.; d.s. chlf.; i. bz. — Decd. by alk. in cold to $\mathrm{SO_2}$ & picric ac., No. **2**.3168.
580	101–2	**m-Diethylbenzenesulphonamide, $\mathrm{Et_2.C_6H_3.SO_2NH_2}$.** — ⟨**⟩ — Ndl. fr. dil. alc.
585	101–2	**(α-)p-Methylpropylbenzene-2-sulphonamide, $\mathrm{Me,Pr.C_6H_3.SO_2NH_2}$.** — ⟨**⟩ — Monoclin. tbl. fr. bz. — E.s. alc.; v.d.s. c. bz.
590	102	**Methylene Thiocyanate, $\mathrm{CH_2(SCN)_2}$.** — Cryst. — Alm. i.c. aq.; s. h. aq.; v.s. alc., eth.
592	103	**Ethylammonium Ethyldithiocarbamate, $\mathrm{EtNH.CS.SNH_3Et}$.** — ⟨G.O.-G.⟩ — 6-sided tbl. fr. alc. — E.s. aq., alc.; r.d.s. eth. — Alc. sol. dec. on water-bath to $\mathrm{H_2S}$ etc. — (Fr. $\mathrm{CS_2}$ & ethylamine.)
597	102.5–3; 107	**Benzenylamino-β-thionaphthol, $\ulcorner\mathrm{C_{10}H_6.S.CPh:N}\urcorner$.** — Ndl. — D.s. c. alc.; e.s. eth., bz. — V. weak base. — Picrate: or. ndl.; m.p. 130–1°.
598	107	**Dehydrothio-m-xylidene, $\ulcorner\mathrm{C_6H_2Me_2.S.C[C_6H_3Me(NH_2)]:N}\urcorner$.** — B.p. 282–4°, (13–14 mm.). — Pr. fr. alc. — I. aq.; d.s. c. alc., e.s. h. — Acetyl deriv.: ndl. fr. alc.; m.p. 227°. — (Pat. as azodyestuff component).
600	102; 105	**Benzylsulphonamide, $\mathrm{C_6H_5.CH_2.SO_2NH_2}$.** — ⟨**⟩ — Pr. — Mod. s. aq., alc. — Corresp. ac.: hygroscop. cryst. (no m.p.), giving toluene & benzoic ac. in KOH fusion.
605	103	**4-Diaminotolyl Sulphide-(3), Thiotoluidine, $\mathrm{[NH_2.C_6H_3.Me]_2S}$.** — Lft. fr. alc. — D.s. h. aq., e.s. eth.; mod. s. alc. — $\bar{\mathrm{B}}$.2HCl: pr. — $\bar{\mathrm{B}}.\mathrm{H_2SO_4.2H_2O}$: ndl.; cryst. anhydr. fr. alc.; e.s. aq., alc., eth.; mostly decd. w. sepn. of $\bar{\mathrm{B}}$ by boiling aq. — $\bar{\mathrm{B}}$.2Pk: silky yel. ndl. fr. bz.; mod. s. h. bz.; m.p. 179°. — Diacetyl deriv.: fr. $\bar{\mathrm{B}}$ & ac. anhydr. (Ber. **20**, 667): ndl. fr. alc., m.p. 211°.
610	103–4 (frothing)	**Phenyldithiocarbazinic Ac., $\mathrm{Ph.NH:NH.CS_2H}$.** — ⟨G.O.-G.⟩ — Fine lust. ndl. — E.s. alc., eth. — Sol. v. unstable. — Heated @ 40–90° dec. to $\mathrm{CS_2}$, $\mathrm{H_2S}$, $\mathrm{NH_3}$ and diphenylthiocarbazide, No. **54**.1155.
615	104	**Benzenesulphonyl-o-nitroanilide, $\mathrm{Ph.SO_2.NH.C_6H_4.NO_2}$.** — ⟨**⟩ — *Yel.* lft. — E.s. alc., chlf.; deliq. in bz.; s. lgr.
625	104–5; 107	**1,2,3,4-Tetraethylbenzenesulphonamide, $\mathrm{Et_4.C_6H.SO_2NH_2}$.** — ⟨**⟩ — Cryst. fr. dil. alc.
630	105	**Thioaniline, o-Diaminophenyl Sulphide, $\mathrm{(NH_2.C_6H_4)_2S}$.** — Thin ndl. fr. aq. — Odorless. — Dec. on distn. to aniline, S, etc. — D.s. h. aq.; e.s. alc., eth., h. bz. — Not at. by alc.-KOH @ 200. — $\bar{\mathrm{B}}$.2HCl + $\mathrm{2H_2O}$: pr.; e.s. aq. w. strong ac. react. — Warmed w. conc. $\mathrm{H_2SO_4}$ sol. colors blue & then violet. The blue sol. poured in water becomes red. — (Delicate react.)! (Fr. aniline & S @ 150–60°).

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " NITROGEN AND SULPHUR. — SOLIDS.
635	105	**Thionylphenylhydrazine, $Ph.NH.N : SO$.** — *S.-yel.* pr. fr. alc. — Vol. w. st. I. aq.; e.s. h. alc., eth., chlf., bz., CS_2. — Dec. on distn. to Ph_2S, Ph_2S_2, etc. — Br gives diazobenzeneperbromide.
640	104–6 (gas evol.)	**Benzenesulphonhydrazid, $Ph.SO_2.NH.NH_2$.** — Cryst. fr. alc. — V.d.s. aq., alc., bz., chlf. — Red. Fehling's & ammon. $AgNO_3$ sol.
645	102; 108	**Ethyl Thiocarbamate, Thiourethane, $NH_2.CO.SEt$.** — Tbl. — I. c. aq.; e.s. h. aq.; e.s. alc., eth. — Heated w. alc.-KOH gives NH_3 & ethylmercaptan (odor!).
650	106–8	**1,3-Dinitrobenzene-4-sulphonic Ac., $(NO_2)_2.C_6H_3.SO_3H.3H_2O$.** — ⟨T. **4**.3-b⟩ — N. Eq. 302. — Long light yel. deliq. pr., crystg. only after long standing over H_2SO_4 in vacuo. Loses aq. @ 130°. — E.s. aq., alc.; d.s. eth.; i. lgr., bz. — Boiled w. KOH sol. gives 2,4-dinitrophenol, No.**2**.3126. — $BaA_2.H_2O$: light yel. tbl. — Chloride: m.p. 102°; cryst. fr. eth. — Amide: silky ndl.; m.p. 154°.
655	107	**uns-Methylphenylthiourea, $MePhN.CS.NH_2$.** — Clear thick rhomb. tbl. fr. alc. — S. alc., bz.; i. lgr. — Boiled w. aniline gives thiocarbanilide & methylaniline.
660	107.5–8.5	**Thioacetamide, $Me.CS.NH_2$.** — Pr. fr. eth. — V.s. aq.; e.s. alc.; s. eth. — Acids or alk. dec. to acetic ac. & H_2S! — $HgCl_2$ gives d.s. cryst. comp. — NaOEt gives methylmercaptan, No. **7**.1350, Na_2S, etc. — Ppts. Ag_2O fr. Ag sol.
665	107; 108; 112	**Isopropylbenzene-p-sulphonamide, $C_3H_7.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Lft. fr. aq. — Mod. s. h aq.
670	108	**5-Nitro-1,3-dimethylbenzene-4-sulphonamide, $(NO_2)Me_2.C_6H_2.SO_2NH_2$.** — ⟨**⟩ — Ndl. fr. dil. alc. — V.s. alc., eth.
675	108	**m-Toluenesulphonamide, $Me.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Lft. or ndl. — V.d.s. c. aq.; e.s. aq. @ 70°; s. c. alc. — Corresp. acid deliquescent.
680	108	**Acetophenonethiosemicarbazone, $PhMeC : N.NH.CS.NH_2$.** — Cryst. fr. bz.
685	108d.	**Hydroxy-phenyl-thiourea, $HO.NH.CS.NHPh$.** — Cryst. mass. — E.s. alk. — Boiled w. alk. gives phenylcyanamide, No. **2**.11 — (Fr. phenyl mustard oil & hydroxylamine).
690	108; 109; 110	**p-Ethylbenzenesulphonamide, $Et.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Corresp. ac. chloride: m.p. 12°.
695	109d.	**Diphenylthiocarbazinic Ac., $Ph_2N.NH.CS_2H$.** — ⟨G.O.-G.⟩ — *Golden* pr. — E.s. alc., eth., chlf. — Dec. fr. 100° to H_2S, CS_2, CNSH, & diphenylamine, No. **2**.1568. — (Fr. CS_2 & α,α-diphenylhydrazine).
700	109–10	**Propylbenzene-4-sulphonamide, $Et.CH_2.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Pearly lft. — E.s. alc., eth., chlf.
705	110–1; 95.5–6	**Thiacet-α-naphthalide, $Me.CS.NH.C_{10}H_7$.** — Tbl. — Reductn. gives ethylnaphthylamine.
710	110	**Benzenesulphonicanilide, $PhSO_2.NHPh$.** — ⟨**⟩ — Tetrag. pr. fr. alc. — 100 pt. aq. @ 16° dis. 4.3 pt.; e.s. alc., eth.
715	110	**Propylthiourea, $NH_2.CS.NHPr$.** — ⟨§⟩ — Glassy monoclin. tbl. fr. alc. — S. aq.; e.s. alc.
720	110–1	**m-Tolylthiourea, $NH_2.CS.NH.C_7H_7$.** — ⟨§⟩ — Pr. — S. h. aq.; e.s. alc., eth.
725	111–11.5	**a,b-Di-m-tolylthiourea, $(C_7H_7NH)_2CS$.** — ⟨§⟩ — Ndl. — E.s. alc., bz., CS_2; alm. i. h. aq. — (Fr. m-toluidine, CS_2 & alc.).
729	110–2	**Benzoyl-o-toluenesulphonamide, $Me.C_6H_4.SO_2NH(Ph.CO)$.** — ⟨**⟩ — Tbl. fr. eth. — D.s. aq.; e.s. alc., eth. — Monobasic acid!
730	111–2	**β-Benzenesulphaminopropionic Ac., $Ph.SO_2.NH.CH_2.CH_2.CO_2H$.** — ⟨T. **4**.3-b⟩ — N. Eq. 229. — Cryst. — D.s. c. aq.; e.s. alc.
735	112	**Phenylthiobiazolinsulphhydrate, ⌜$NPh.CH_2.S.C(SH) : N$⌝.** — Lft. fr. bz. — E.s. alc., bz., chlf.; alm. i. lgr.; v.s. dil. alk.; s. oil of vit. w. malachite green color. — $FeCl_3$ gives a disulphide: or.-red lft. fr. chlf. + alc.; m.p. 135°.
737	112	**α-Naphthalenesulphonic Anilide, $C_{10}H_7.SO_2.NHPh$.** — ⟨**⟩ — Ndl.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND SULPHUR. — SOLIDS.
740	112–3	**p-Nitrophenyl Isothiocyanate, $NO_2.C_6H_4.N : C : S$.** — ⟨‡⟩ — *Light yel.* ndl. fr. gl. ac. ac. — E.s. eth., bz., h. gl. ac. ac.
745	112–3	**(β)-1-Methyl-4-propyl-3-sulphonamide, $Me,Pr.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Lust. scales fr. bz.
750	113	**Ethylthiourea, $EtNH.CS.NH_2$.** — ⟨§⟩ — Ndl. — V.s. aq., alc. — S easily removed in aq. sol. by PbO.
755	113	**s-Methylphenylthiourea, $MeNH.CS.NHPh$.** — ⟨§⟩ — 6-sided tbl. — E.s. alc. — Boiled w. aniline gives thiocarbanilide, No. **54**.1180.
760	113	**a,a-Ethylphenylthiourea, $NEtPh.CS.NH_2$.** — ⟨§⟩ — Pearly pr. fr. alc.
765	113	**Pseudocumene-3-sulphonamide, $Me_3.C_6H_2.SO_2NH_2$, (Me_3 = 1,2,4).** — ⟨**⟩ — Cryst. fr. alc.
770	**114**	**2,4,6-Trinitrothiophenol, Thiopicric Ac., $(NO_2)_3C_6H_2.SH$.** — Sm. *yellowish* ndl. — Explodes violently @ 115°! — E.s. aq., alc., eth., chlf., bz.; alm. i. CS_2, lgr. — Dec. on boiling w. aq. or alc. — KĀ: red-br. ndl.; v.s. aq., alc.; explodes violently @ 140°.
775	**114**	**a,b-Dimethylphenylthiourea, NHMe.CS.NMePh.** — ⟨§⟩ — Glassy pr. — Alm. i. aq.; v.s. alc. — Boiled w. aniline gives thiocarbanilide, No. **54**.1180, methylamine, No. **2**.1059 & methylaniline, No. **2**.1304.
780	**115**	**Benzenyl-o-aminothiophenol, μ-Phenylbenzothiazole, ⌜$C_6H_4.S.CPh : N$⌝.** — Ndl. fr. alc. — Dist. alm. undecd. — Odor, when melted, aromatic, sweetish like geranium. — S. alc., eth., CS_2, conc. HCl. — (Not decd. by conc. HCl @ 100°.) — Fusion w. KOH gives benzoic ac. (Vol. I) & o-aminothiophenol, No. **54**.50.
785	115	**m-Nitrophenylthiourethane, $C_6H_4(NO_2).NH.CS.OEt$.** — Large *yel.* pr. fr. alc. — E.s. alc.; s. NaOH. — (Fr. m-nitraniline, CS_2 & alc.).
790	115.5	**(α)-1-Methyl-4-isopropyl-2-sulphonamide, $Me,Pr.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Lft. — $AgC_2H_3O_2$ ppts. $C_{10}H_{13}SO_2.NHAg$ fr. sol. in boiling aq.
795	115–6	**Thiobenzamide, $PhCS.NH_2$.** — Ndl. fr. h. aq. — Red. by Zn & HCl in alc. sol. to benzylamine, No. **2**.1236. — HgO gives benzonitrile, No. **2**.2781, & HgS.
800	115–6	**Dithionyl-p-phenylenediamine, $C_6H_4(N.SO)_2$.** — *Yel.* cryst. fr. bz. — Mod. s. alc., eth.; e.s. h. bz. — (Fr. $SOCl_2$ & p-phenylenediamine).
805	115–6	**Nitrothienol, $(NO_2)(HO).C_4H_2S$.** — Ndl. — S. aq., eth.; s. alk. w. yel. color.
810	116	**p-Anisolesulphonamide, $MeO.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Ndl. fr. aq.
815	117	**p-Toluenesulphonic-p-toluide, $C_7H_7SO_2.NHC_7H_7$.** — ⟨**⟩ — Cryst. — E.s. h. alc.
820	118	**Tetramethyldiaminophenyl Disulphide, " Dithiodimethylaniline ", $[Me_2N.-C_6H_4]_2S_2$.** — Small *yel.* lust. ndl. fr. alc. — I. aq.; e.s. CS_2; less s. h. bz., alc., eth., lgr. — Sol. in alc. + HCl gives yel. floc. ppt. of $\bar{B}_2.PtCl_4$, w. $PtCl_4$.
825	118	**Methylthiourea, $MeNH.CS.NH_2$.** — ⟨§⟩ — Pr. — E.s. aq., alc.; d.s. eth.
830	abt. 119	**Benzylammonium Benzyldithiocarbamate, $PhCH_2.NH.CS.SNH_3.CH_2Ph$.** — ⟨G.O.-G.⟩ — Cryst.
835	119	**o-Diethylbenzenesulphonamide, $Et_2.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Rhomb. tbl. fr. dil. alc.
840	abt. 120	**Aminoanilinophenyl Disulphide, $NH_2.C_6H_4S.S.C_6H_4.NH.Ph$.** — *Yel.* ndl. fr. abs. alc. — PbO_2 changes sol. in alc. + HCl emerald-green and then blue. — (Fr. aniline, S, & HCl @ 200°.)
845	120; 122	**Benzenesulpho-p-toluide, $C_6H_5SO_2.NH.C_6H_4.Me$.** — ⟨**⟩ — V.s. alc., bz., alkalies.
850	122	**2-Nitrophenol-4-sulphonic Ac., $(NO_2)(HO).C_6H_3.SO_3H$.** — ⟨T. 4.3-b.⟩ — N. Eq. 219. — Flat ndl. w. $3H_2O$ fr. h. aq.; m.p. 51.5°. — E.s. aq., alc.; somewhat s. eth.
855	122	**1,2,4,5-Tetraethylbenzenesulphonamide, $Et_4.C_6H.SO_2NH_2$.** — ⟨**⟩ — Lft. fr. dil. alc.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
860	124–5	**p-Ditolubenzylthiourea, $SC.(NH.CH_2.C_6H_4Me)_2$.** — ⟨§⟩ — Lust. lft. fr. alc.
865	125	**$3,3^1$-Azoxybenzenedisulphonic Ac., $(HSO_3.C_6H_4)_2.N_2O$.** — ⟨T. **4**.3⟩ — *Yel.* mic. ndl. — V.s. aq., alc., eth. — $Ba\bar{A}.H_2O$: yel.-red rhomb. pr.; 100 g. aq. sol. cont. 2.519 g. dry salts @ 21°. — Chloride: yel.-red cryst. fr. toluene; m.p. 138°. — Amide: yel. pr.; v.d.s. h. aq.; m.p. 273°.
870	125	**α-Pyridylmercaptan, Pyridinethiol-(2),$HS.C_5H_4N$.** — *Yel.* pr. fr. bz. — D.s. c. aq., eth., lgr.; e.s. alc., bz. These solutions deep yel. Alm. colorless & odorless in conc. ac. or dil. alk. sol.! — Oxidn. w. I in alk. gives pyridyldisulphide, No. **54**.170: m.p. 57–8°. (Ber. **33**, 1559).
875	125	**α-Benzenesulphaminocaproic Ac., $Me.(CH_2)_3.CH(NH.SO_2Ph).CO_2H$.** — ⟨T. **4**.3-b⟩ — N. Eq. 256. — Ndl. fr. aq.
880	125–6	**Benzenesulphonyl-p-aminophenol, $HO.C_6H_4.NH.SO_2.Ph$.** — S. alk. — (Fr. p-aminophenol & $Ph.SO_2Cl$ in alk. sol.)
885	125	**Thiodimethylaniline, Tetramethylthioaniline, $[Me_2N.C_6H_4]S$.** — Ndl. fr. alc. — Dist. alm. undecd. — D.s. c. alc.; more sol. eth.; e.s. acids. — "Unchanged in KOH-fusion." Conc. HCl no action @ 300°. — Salts v. unstable. — $\breve{B}$Pk: yel. ndl.; i. aq.; d.s. alc.; m.p. 142°.
890	125–6; 124	**Benzenesulphonyl-o-acettoluide, $Ph.SO_2NH.C_6H_4.Me$.** — ⟨**⟩ — Ndl. fr. dil. alc. — E.s. alc., eth.
895	125	**Trimethylamine + CS_2, $Me_3N.CS_2$.** — Colorless cryst. — Dec. at room temp. — S. dil. alc., chlf.; d.s. aq.; alm. i. eth., bz., CS_2.
900	126	**α-Benzenesulphaminopropionic Ac., $Me.CH(SO_2Ph).CO_2H$.** — ⟨T. **4**.3-b.⟩ — N. Eq. 214. — Ndl. fr. aq. — D.s. c. aq.; e.s. alc., eth.
905	abt. 126 sl. d.	**Benzsulphhydroxamic Ac., $PhSO_2.NHOH$.** — ⟨T. **4**.3⟩ — Rhomb. tbl. fr. aq. — E.s. alc., eth., warm aq.; d.s. chlf., bz.
910	127	**p-Azobenzenesulphonic Ac., $Ph.N_2.C_6H_4.SO_3H.3H_2O$.** — *Deep or.-red* lft.! — Loses some cryst. aq. over H_2SO_4. — D.s. alc., eth.; s. in 17 pt. aq. @ 10°. — $Ba\bar{A}_2$: yel. ndl. ; v.d.s. h. aq. — (Strong acid). — Chloride: or.-yel. ndl. fr. eth. — Amide: or.-yel. powd.; d.s. h. alc.
915	127	**Methylphenyl-β-naphthylthiourea, $MePhN.CS.NH.C_{10}H_7$.** — ⟨§⟩ — D.s. long yel. ndl.
920	127.5–8; 130–2	**Thioacet-p-toluide, $Me.CS.NH.C_7H_7$.** — ⟨**⟩ — Pr. — Taste, v. bitter.
925	128	**Propylbenzene-2-sulphonamide, $Et.CH_2.C_6H_4.SO_2NH_2$.** — ⟨**⟩.
930	128	**m-Anisolesulphonamide, $MeO.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Ndl. — (Pat.).
935	126; 131	**m-Phenetolesulphonamide, $EtO.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Ndl. fr. h. aq.
940	128	**2-Nitrotoluene-4-sulphonamide, $(NO_2).C_6H_3.Me,(SO_2NH_2)$.** — ⟨**⟩ — Cryst.
945	128	**Dicumylthiourea, $CS(NH.C_{10}H_{13})_2$.** — ⟨§⟩ — Ndl.
950	128–9	**p-Thiobenzotoluide, $PhCS.NH.C_6H_4Me$.** — Long *yel.* ndl.
955	128–9	**Di-benzenesulphonyl-anilide, $(Ph.SO_2)N.Ph$.** — ⟨**⟩ — Cryst. — I. alk.
960	129	**Phenylthiocarbizin, ⌜$C_6H_4.S.CH.N.NH$⌝.** — Silvery lft. fr. h. aq. — V.d.s. c. aq.; e.s. alc., eth., chlf. — V. stable! — Alk. hypochlorite sol. gives floc. dark violet ppt. in aq. sol., wh. is alm. i. most solvents; but s. in conc. H_2SO_4 w. deep red color! — $Ag\bar{A}$: floc. ppt. w. ammon. $AgNO_3$ sol. — $\breve{B}.HCl$: ndl.; m.p. 240° d.; e.s. aq. — Picrate: yel. ndl.; d.s. aq.
964	130–1	**3-Nitro-4-sulphobenzoic Ac., $(HSO_3)(NO_2).C_6H_3.CO_2H + 2H_2O$.** — ⟨T. **4**.3-b.⟩ — N. Eq. 141.5. — Short thick pr. fr. aq. — E.s. aq.; v.d.s. alc.; alm. i. eth., chlf., CS_2.
965	130	**4-Nitrotoluene-2-sulphonic Ac., $NO_2.C_6H_3Me.SO_3H$.** — ⟨T. **4**.3-b.⟩ — N. Eq. 217. — Cryst. w. $2\frac{1}{2}H_2O$, (m.p. 133.5°). — 100 pt. aq. sol. contains 67.7 pt. cryst. ac. @ 33°. — $Ba\bar{A}_2.3Aq$: cryst. aggreg.; 3.34 anhydr. salt dis. in 100 pt. aq. @ 18.5°. — Chloride: m.p. 44°; tbl. fr. eth. — Amide: ndl.; d.s.c. aq.; m.p. 186°. — (An intermediate of importance in mfg. of stilbene dyestuffs).
970	130 (unc.)	**Piperidylthiuramdisulphide, $(C_5H_{10}N.CS-)_2S_2$.** — Cryst. fr. alc. or eth. — I. aq.; s. alc., eth.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND SULPHUR. — SOLIDS.
975	130c.	**p-Phenylenemustard Oil, $C_6H_4(NCS)_2$.** — ⟨‡⟩ — Lust. ndl. fr. gl. ac. ac.
980	131	**2,4-Dinitrothiophenol, $(NO_2)_2.C_6H_3.SH$.** — Ndl. — D.s. aq.; v.s. alc. — Oxid. easily by air to corresp. disulphide.
985	131	**p-Nitrobenzenesulphonamide, $NO_2.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Fine ndl. — Mod. s. h. aq. — (Free acid not described).
990	131	**1-Naphthylamine-3-sulphonamide, $NH_2.C_{10}H_6.SO_2NH_2.H_2O$.** — ⟨**⟩ — Lust. ndl. — Corresp. ac.: d.s. yel. ndl.
995	131–2	**Benzenesulphonyl-m-nitranilide, $Ph.SO_2.NH.C_6N_4.NO_2$.** — ⟨**⟩ — Flat yel. ndl. fr. alc. — E.s. alc., chlf.; v.s. bz.
1000	131.5–2	**Benzenesulphonicacidmethylphenylhydrazide, $PhSO_2.NH.NMePh$.** — ⟨**⟩ Lust. ndl. fr. alc.
1002	132	**β-Naphthalenesulphonic Anilide, $C_{10}H_7.SO_2.NHPh$.** — ⟨**⟩ — Ndl.
1005	133	**Benzenesulphaminoazobenzene, $PhSO_2.NH.C_6H_4.N_2.Ph$.** — ⟨**⟩ — Ndl. fr. alc. — Mod. s. alc., bz.
1010	134–5; 132–2.5	**a,a-Dimethylphenylthiourea, $NMe_2.CS.NHPh$.** — ⟨§⟩ — Pr. fr. alc. — Boiled w. aniline gives off dimethylamine, No. **2**.1061.
1015	136	**Oxymethenylaminothiophenol, μ-Hydroxybenzothiazole, ⌜$C_6H_4.N:C(OH).S$⌝.** — Cryst. fr. alc. — I. aq.; e.s. alc., eth., alk.
1020	137	**p-Toluenesulphonamide, $Me.C_6H_4.SO_2.NH_2$.** — ⟨**⟩ — Lft. — S. in 515 pt. aq @ 9°, or 13.5 pt. alc. @ 5°. — E.s. NaOH sol. — Corresp. ac.: m.p. 92°, No. **7**.550.
1025	137	**Isobutylbenzenesulphonamide, $C_4H_9.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Lust. ndl.
1030	137	**1,3-Dimethylbenzene-4-sulphonamide, $Me_2.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Ndl. fr. aq.
1035	137	**Phenethylthiourea, $PhCH_2.CH_2.NH.CS.NH$.** — ⟨§⟩ — Cryst.
1040	137.5d.	**Thioformanilide, $PhNH(CHS)$.** — Lft. fr. aq. — Partly dec. in melting to H_2S & phenylisocyanate (odor)! — Taste intensely bitter! — E.s. eth.; s.c. alk. — Hot alk. gives aniline, No. **2**.1235, formic ac. & H_2S.
1045	138–9	**Benzenesulphon-1,4-dimethylbenzene, $Me_2.C_6H_3.NH.SO_2.C_6H_5$.** — ⟨*⟩ — Cryst.
1050	138.5–140 (dried over H_2SO_4)	**Sinalbin, $C_{30}H_{42}O_{15}N_2S_2$.** — Cryst. in pale yellowish ndl. w. $5H_2O$, melting @ 83–4°. — E.s. h. aq. (Sol. l-rotat.). — Alm. i. c. alc.; i. eth., CS_2. — Colored intensely yel. by least trace of alk.! — HNO_3 gives transient blood red color. — Red. Fehling's sol. — Boiling w. NaOH sol. gives Na_2SO_4 & NaCNS. — $HgCl_2$ soon gives cryst. ppt. in aq. sol. — (Fr. seed of white mustard).
1055	139	**Benzenesulphonyl-p-nitroanilide, $Ph.SO_2.NH.C_6H_4.NO_2$.** — ⟨**⟩ — *Yel.* cryst. fr. bz. + lgr. — E.s. alc., bz.; less s. chlf., lgr.
1060	141–2	**1,3,5-Trimethylbenzenesulphonamide, $Me_3.C_6H_2.SO_2NH_2$.** — ⟨**⟩ — Hair-like ndl. fr. aq. — S. in 3000 pt. c., or in 185 pt. boiling aq. — S. in 18 pt. 83% alc. @ 0°. — Corresp. ac.: m.p. 77°.
1065	142	**m-Aminobenzenesulphonamide, $NH_2.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Lust. lft. — D.s. c. aq.; e.s. h. aq., alc. — Corresp. Ac.: s. in 68 pt. aq. @ 15°; gives resorcinol (Vol. I) on protracted KOH-fusion; its Ba salt (+ $6H_2O$) is e.s. aq.
1070	142	**α-Thiophenesulphonamide, $C_4H_3S.SO_2NH_2$.** — ⟨**⟩ — Fine ndl. fr. aq. — Corresp. ac.: deliq. cryst. mass giving thiophene on distn. — $Ag\bar{A}$: pearly scales by pptn. of alc.; s. w. ammon. $AgNO_3$.
1075	142	**Benzenesulphonylphenetidine, $EtO.C_6H_4.SO_2.C_6H_5$.** — ⟨*⟩ — Ndl. fr. alc. — Sol. in conc. Na_2CO_3 treated w. sol. of I in KI gives benzene sulphon-diphenetidine: ndl. fr. alc.; m.p. 168°.
1077	143; 132–4d.	**Carbaminothioglycollic Ac., $NH_2.CO.S.CH_2.CO_2H$.** — ⟨T. **4**.3-a⟩ — Pr. — E.s. alc., warm aq.; less s. eth. — Decd. by boiling aq. w. sepn. of thioglycollic ac. — (Fr. thiocyanate salts & HCl.)
1080	143	**4-Nitro-4′-aminophenyl Sulphide, $NO_2.C_6H_4.S.C_6H_4.NH_2$.** — *Or.* pr. w. bluish reflect. fr. bz. — E.s. alc. — Acetyl deriv: ndl. fr. alc.; m.p. 110°.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
1085	143	**p-Toluenesulphonylaminophenol, $HO.C_6H_4.NHSO_2.C_6H_3Me$.** — ⟨**⟩ — Ndl.
1090	144	**1,2-Dimethylbenzene-4-sulphonamide, $Me_2.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Cryst. fr. alc.
1095	145–6	**Thioacet-β-naphthalide, $Me.CS.NH.C_{10}H_7$.** — Ndl. fr. alc. (Rapidly cooling sol.)
1097	145–6	**Nitro-α-thiophenecarbonic Ac., $NO_2.C_4H_2S.CO_2H$.** — ⟨T. **4**.3-b⟩ — N. Eq. 173. — Long ndl. wh. change to thick cryst. of m.p. 125° after standing some time under aq. — E.s. alc.; s. h. aq. — Alc. sol. w. trace NaOH colors magenta (discharged by x.s. NaOH).
1099	146c.	**i.-Benzenesulphonylleucin, $Me_2.CH.CH_2.CH(NH.SO_2Ph).CO_2H$.** — ⟨T. **4**. 3-b.⟩ — Pr. fr. aq. — S. in 80 pt. boiling aq.; e.s. alc., eth., chlf.
1100	146.5	**Benzenesulphonyl-3,4-toluylenediamine, $Ph.SO_2NH.C_6H_3Me.NH_2$.** — ⟨**⟩ — Ndl. fr. dil. alc. — D.s. aq.; e.s. alc., gl. ac. ac.
1105	147	**Benzoylbenzenesulphamide, $C_6H_5.SO_2.NH(CO.C_6H_5)$.** — ⟨**⟩ — Ndl. fr. alc. — E.s. h. alc.; d.s. eth.; less s. aq. — Reacts acid; s. in ammon. & in alk. carb. w. evol. CO_2! — Heating above 150° gives benzonitrile, No. **2**.2781.
1110	147–8	**1,4-Dimethyl-2-sulphonamide, $Me_2.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Ndl. — R.d.s. h. aq.
1112	147–50	**Benzoyl-p-toluenesulphonamide, $Me.C_6H_4.SO_2NH(Ph.CO)$.** — ⟨**⟩ — 4-sided flat pr. fr. alc. — D.s. c., e.s. h. alc.; v.d.s. h. aq., eth. — Monobasic ac., decg. carbonates!
1115	148	**β-Thiophenesulphonamide, $C_4H_3S.SO_2NH_2$.** — ⟨**⟩ — Deliq. cryst. mass. — E.s. aq. — Gives deep blue color w. isatine & oil of vit. on warming!
1120	148; 146	**sym-Dibenzylthiourea, $(C_7H_7NH)_2CS$.** — ⟨§⟩ — 4-sided tbl. fr. alc. — I. aq. s. alc., eth. — Treatment w. alc. + HgO gives uns-dibenzylurea, No. **2**.2034.
1125	148–9d.	**Compound, $\ulcorner CS.NH.CHMe.NH.CHMe.NPh \urcorner$.** — Silvery ndl. — I. aq.; s. alc., eth., chlf. — Warmed w. acid or alk. gives acetaldehyde. — (Fr. aldehydeammonia & phenylmustard oil).
1130	148–50 (w. gas evol.)	**Benzenesulphonicphenylhydrazide, $PhN_2H_2.SO_2Ph$.** — ⟨**⟩ — Lft. fr. chlf. — I. c. aq., dil. ac. or alk.; d.s. h. chlf.; s. h. alc.; alm. i. eth. CS_2. — Red. Fehling's sol. on warming! — W. h. NaOH sol. gives C_6H_6, $PhSO_2Na$, N_2 & H_2O. — (Fr. phenylhydrazine & $PhSO_2Cl$ in eth.).
1135	149	**2,4-Toluylenethiourea, $\ulcorner C_6H_3Me.NH.CS.NH \urcorner$.** — Yellowish cryst. powd. — E.s. alc.; s. eth., gl. ac. ac.; i. bz. — Gives isonitrile react. (T. **2**.12) w. alc.-KOH & chlf. — (Fr. CS_2 & toluylenediamine).
1140	145–55	**m-Nitrodiphenylthiourea, $NO_2.C_6H_4.NH.CS.NHPh$.** — *Yel.* ndl. or crusts. — D.s. c. alc., bz., chlf., CS_2: e.s. h. alc. — (Fr. m-nitraniline & phenylmustard oil @ 100°).
1143	149–50	**Dianisylthiourea, $(MeO.C_6H_4.CH_2.NH)_2.CS$.** — ⟨§⟩ — Ndl. fr. alc.
1145	150; 149; 147–8; 156	**Benzenesulphonamide, $C_6H_5SO_2NH_2$.** — ⟨**⟩ — Ndl. fr. aq., lft. fr. alc. — 100 pt. aq. @ 16° dis. 0.43 pt. — E.s. h. alc., eth. — Ammon. $AgNO_3$ gives cryst. ppt. w. alc. ammon. sol. of amide. — Corresp. ac.: deliq.
1150	150	**α-Naphthalenesulphonamide, $C_{10}H_7.SO_2NH_2$.** — ⟨**⟩ — Cryst. — E.s. alc., eth.
1155	abt. 150	**Diphenylthiocarbazide, $(Ph.NH.NH)_2.CS$.** — 3-sided pr. fr. h. alc. — D.s. c. alc., bz. — Melts to dark green liq.! — Boiled w. alc. becomes green. — S. w. deep red color & decn. in h. dil. alk.
1160	150	**Triphenylguanylthiourea, $PhNH.CS.NPh.C(NH).NHPh$.** — Cryst. — D. s. h. alc.; e.s. chlf. — Dec. in melting to thiocarbanilide & thiocyanates of diphenylguanidine, etc.
1165	150–1	**Tetrabenzenesulphon-o-phenylenediamine, $C_6H_4.(N(SO_2Ph)_2)_2$.** — Cryst. — D.s. alc. — (Decd. by conc. HCl to o-phenylenediamine & $PhSO_3H$.).
1170	152	**Triphenylthiourea, $Ph_2N.CS.NHPh$.** — ⟨§⟩ — Long ndl. fr. alc. — D.s. c. alc. — Boiling w. aniline gives thiocarbanilide, No. **54**.1180, & diphenylamine, No. **2**.1568.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
1175	152–3	**Di-4-amino-1,3-dimethylthiourea, $CS.(NH.C_6H_3.Me_2)_2$.** — ⟨**⟩ — Cryst. — V.d.s. h. alc. — (Fr. xylidine & CS_2).
1180	153; 151	**Thiocarbanilide, Sulphocarbanilide, s-Diphenylthiourea, NHPh.CS.NHPh.** — ⟨§⟩ — Lust. lft. — Alm. i. aq.; e.s. h. alc., eth. — S. alk.; repptd. by acids or CO_2! — Ⓟ Gives v. faint carbylamine odor in T. **2**.12. — Dist. slowly alm. to dryness 1.0 g. w. 5 cc. conc. HCl in 25 cc. distg. flask. Phenylmustard oil w. pungent odor (No. **54**.2225) separates as layer fr. distillate. — Ⓓ Boil 0.14 g. of the comp. for 10 min. under reflux w. 10 cc. alc. in t.t. or small flask with freshly prepared yellow mercuric oxide. (Prepared by pouring sol. of 0.4 g. HgCl in 5 cc. alc. into abt. 10 cc. (an x.s.) alc.-KOH sol. & washing the pptd. oxide 4 times w. 5 cc. alc. Red HgO is not a suitable substitute). Filter hot. Wash filter w. 5 cc. h. alc. Conc. filtrate to 10 cc. Dilute w. 10 cc. h. aq. Filter hot. Cool. Wash separating cryst. w. 3 cc. dil. alc. (1:1). — Recryst. fr. 10 cc. h. 50% alc. — The product, carbanilide, No. **2**.2580, is obtained in good yield as colorless ndl.; m.p. 236° u.c.
1185	d.153	**Thiuram Disulphide, Thiocarbamic Disulphide, $NH_2.CS.S.S.CS.NH_2$.** — ⟨G.O.-L.⟩ — Pearly scales fr. acetone & chlf. — I. chlf. — I. aq., eth.; s. h. alc. — Boiled w. aq. gives CS_2, No. **7**.1365, S, & NH_4SCN (Test w. $FeCl_3$). — S. alc.-KOH, giving KCNS & K_2S_x.
1190	153–5 (sl. heating); 165–87(r.h.)	**o-Sulphaminobenzoic Ac., $NH_2SO_2.C_6H_4.CO_2H$.** — ⟨T. **4**.3-b⟩ — N. Eq. 201. — Ndl. or pr., changing completely to its anhydride, saccharine (No. **54**.1745), at 180°, & partially at m.p. — E.s. aq., alc., eth. — Taste v. sweet after conversion to saccharine by heat (not previously). — $Ba\bar{A}_2$.2,4½ or $7H_2O$: r.d.s. aq.; s. eth.
1195	153–4; 155	**o-Toluenesulphonamide, $Me.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Octahedra fr. alc. — S. in 958 pt. aq. @ 9° or 28 pt. alc. @ 5°. — Corresp. ac.: leafy cryst. w. $2H_2O$ of cryst. (no m.p.). — Oxidn. by aq. $KMnO_4$ sol. (Am. **9**, 405) gives saccharine! (No. **54**.1745).
1200	154; 153–5 (sl.h.); 165	**1,3-Dinitrobenzene-4-sulphonamide, $(NO_2)_2.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Silky ndl. — Corresp. acid: e.s. aq.; m.p. 106–8°; No. **54**.650.
1205	154	**Phenylthiourea, $PhNH.CS.NH_2$.** — ⟨§⟩ — Ndl. — 100 pt. aq. dis. 0.26 pt. @ 18° or 5.93 pt. @ 100°. — 100 pt. alc. @ 16° dis. 5.59 pt. or 67.97 pt. @ boiling temp. — Sol. in alk.; repptd. by acid. — Taste, very bitter! — Gives distinct carbylamine odor in T. **2**.12. — 1.0 g. + 5 cc. conc. HCl slowly distd. alm. to dryness in 25 cc. distg. flask gives some pungent smelling phenylmustard oil (No. **54**.2225) wh. sep. as layer fr. dist. — Dec. in tube @ 180° to thiocarbanilide, aniline, NH_4SCN, NH_3, etc. — Boiled w. aniline gives thiocarbanilide: No. **54**.1180.
1210	154	**m-Nitrobenzenesulphonicphenylhydrazide, $NO_2.C_6H_4.SO_2.N_2H_2.Ph$.** — ⟨**⟩ — *Light yel.* ndl. — D.s. aq.; e.s. alc.
1215	154	**Thionyldimethylaniline, $(MeNH.C_6.H_4)_2.SO$.** — Ndl. fr. chlf. + lgr. — V.s. alc., chlf.; i. eth., lgr.
1220	abt. 155	**Hydroxydithiodiphenylamine, $\ulcorner C_6H_3(OH).NH.C_6H_4.S.S.\urcorner$.** — *Yel.* powd. — (Pat.) — (Fr. m-oxydiphenylamine & S).
1225	155	**1,2,4,5-Tetramethylbenzene-3-sulphonamide, $Me_4.C_6H.SO_2NH_2$.** — ⟨**⟩ — Pr. fr. alc. — Alm. i. c. aq.; r.d.s. alc.; d.s. eth.
1230	155d.	**p-Toluenesulphonicacidphenylhydrazide, $Me.C_6H_4SO_2.NH.NHPh$.** — ⟨**⟩ — Ndl. fr. alc. — I. eth., bz. — Warmed w. dil. NaOH gives N_2, bz. & toluenesulphinic ac., No. **7**.485.
1235	156; 154	**Phenylmustard Oil Sulphide, $\ulcorner NPh.C(NPh).S.S.CS\urcorner$.** — Cryst. fr. ac. ac. — *Deep yel.* ndl. fr. abs. alc. — E.s. CS_2, bz.; v.s. chlf.; d.s. abs. alc. — Conc. KOH gives CO_2, H_2S, aniline, No. **2**.1235, & phenylmustard oil, No. **54**.2225. — Warm alc.-KOH gives phenylurethane, No. **2**.1544.
1240	157	**o-Tolidinemustard Oil, $(-Me.C_6H_3.N : CS_2)_2$.** — ⟨‡⟩ — Clear tbl. fr. bz.
1242	157	**Isopropylthiourea, $NH_2.CS.NH.Pr$.** — ⟨§⟩ — Lft.
1245	158; 156; 165	**Di-o-tolylthiourea, $(C_7H_7NH)_2CS$.** — ⟨§⟩ — Ndl. — E.s. h. alc., bz., gl. ac. ac., eth. — Boiled w. aniline gives o-toluidine, No. **2**.1262, & thiocarbanilide, No. **54**.1180.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND SULPHUR. — SOLIDS.
1250	159	**Ammonium Thiocyanate, $NH_4.SCN$.** — ⟨T. **4**.15⟩ — Cryst. — 100 pt. aq. @ 0° dis. 122.1 pt. — $FeCl_3$ colors sol. blood red! — Corresp. ac., unstable.
1255	159; 158–9; 169–70	**uns-Diethylthiourea, $NH_2.CS.NEt_2$.** — ⟨§⟩ — Deliq. pr.
1260	159	**Carbanilaminothiophenol, Anilinobenzothiazole, $\ulcorner C_6H_4.S.C(NH.C_6H_5):N\urcorner$.** — Ndl. — Dist. undecd. — Picrate, B̄.Pk: yel. ppt.; sol. abs. alc., m.p. 222°. — Acetyl deriv.: ndl. fr. alc.; m.p. 167°. — (Fr. aminothiophenol & phenylmustard oil.)
1265	abt. 159d.	**m-Nitrobenzylsulphonamide, $NO_2.C_6H_4.CH_2.SO_2NH_2$.** — ⟨**⟩ — Cryst. fr. h. aq.
1270	160	**N^4-p-Toluenesulphonyl-2,4-diaminotoluene, $Me(NH_2).C_6H_3.(NH.SO_2.C_6H_4.Me)$.** — **(Me, (NH_2), $(NH.SO_2.C_6H_4.Me)$ = 1,2,4).** — ⟨**⟩ — Cryst. powd. — S. dil. NaOH or min. ac. — (D.R.P. 135016 as azo-color component.)
1275	160–1	**m-Dinitrodiphenylthiourea, $(NO_2.C_6H_4.NH)_2CS$.** — ⟨§⟩ — Sm. *yel.* ndl. — (Fr. m-nitroaniline, CS_2 & KOH).
1280	161	**3-Diisopropylthiourea, $CS.(NH.Pr)_2$.** — ⟨§⟩ — Felted ndl. fr. h. aq.
1285	165; 155–7	**Phenyl-β-naphthylthiourea, $Ph.NH.CS.NH.C_{10}H_7$.** — ⟨§⟩ — Silvery lft. fr. alc. — (Heating w. conc. HCl @ 140° gives aniline, β-naphthylamine, phenylmustard oil & β-naphthylmustard oil).
1290	160–1	**Benzenesulphonylbenzidine, $PhSO_2.NH.C_6H_4.C_6H_4.NH_2$.** — ⟨**⟩ — Ndl. fr. dil. alc. — E.s. alc., NaOH. — (Fr. benzidine + bz. sulphonyl chloride + NaOH.)
1295	161	**m-Nitrobenzenesulphonamide, $NO_2.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Ndl. — V.d.s. c. aq.; e.s. alc. — Corresp. acid.: flat deliq. lft.
1300	162	**Azobenzenedisulphide, $[Ph.N_2.C_6H_4.S]_2$.** — *Yel.* lfr. fr. bz.
1305	162	**Thiooxamindiphenylamidine, " Thioamide ", $C_6H_5NH.CPh.CS(NH_2)$.** — *Yel.* pr. fr. alc. — (An intermediate of Sandmeyer's indigo synthesis).
1310	162–3; 158–9	**Phenyl-α-naphthylthiourea, $PhNH.CS.NH.C_{10}H_7$.** — ⟨§⟩ — Lft. — D.s. alc., eth. — (Dec. w. 34% HCl @ 150–60° to aniline, α-naphthylamine, & phenyl & naphthylmustard oils). — (Fr. naphthylmustard oil & aniline).
1315	161–2; 164	**Benzylthiourea, $C_7H_7NH.CS.NH_2$.** — ⟨§⟩ — Pr. — I. c. aq.; s. 60 pt. c. alc.
1320	163; 156	**o-Phenetolesulphonamide, $EtO.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Ndl.
1325	164	**4-Toluidine-2-sulphonamide, $Me,NH_2.C_6H_3.SO_2NH_2$.** — ⟨**⟩ — Silky ndl. or pearly scales. — D.s. c. aq.; e.s. h. aq., alc. — Corresp. ac.: d.s.c. aq., the c.s. being colored bordeaux-red by $FeCl_3$).
1330	165d.	**Dimethylsulphaminic Ac., $Me_2N.SO_2.OH$.** — ⟨T. **4**.3⟩ — 6-sided tbl. fr. alc. — E.s. aq., h. alc.; v.d.s. eth. — Boiled w. aq. or KOH sol. v. slowly decd. to Me_2NH & H_2SO_4. — Strong ac. — $Ba\bar{A}_2.H_2O$: lft.; c.s. aq.
1335	165	**2,6(?)-Dinitrotoluene-4-sulphonic Ac., $(NO_2)_2.C_6H_2Me.SO_3H$.** — ⟨T. **4**.3; **4**.10⟩ — N. Eq. 262. — *Pale yel.* flat rhomb. cryst. Cryst. w. $2H_2O$. — V.s. aq., alc. — Chloride: m.p. 123–5°. — Amide: lft; m.p. 203°.
1340	166	**1-Phenyl-2,3-dimethyl-5-thiopyrazolone, " Thiopyrine ", $\ulcorner NPh.NMe.CMe:CH.CS\urcorner$.** — Colorless cryst. — Mod. s. c., e.s. h. aq. — (Antipyretic.)
1345	167–8	**Thiocarbamino-β-naphthol, $\ulcorner C_{10}H_6.N:C(SH).O\urcorner$.** — Ndl. fr. dil. alc. — E.s. alc.; alm. i. bz.; s. NaOH. — W. HCl @ 150–80° gives amino-naphthol & H_2S. — (Fr. aminonaphthol & CS_2.)
1350	168	**s-Dibenzenesulphonylethylenediamine, $PhSO_2.NH.CH_2.CH_2.NH.SO_2Ph$.** — ⟨**⟩ — Ndl. fr. alc. — D.s. aq.
1352	168 (frothing)	**Thiobiazdithiol, $\ulcorner S.C(SH):N.N:C:(SH)\urcorner$.** — Ndl. fr. eth. — D.s. chlf., bz. — Turns yel. in air. Strongly acid! — Oxidn. by I in alc. sol. gives a disulphide: Lemon yel. cryst. fr. h. alc.; m.p. 175°.
1355	169; d. from 150	**4,4¹-Azobenzenedisulphonic Ac., $N_2(C_6H_4.SO_3H)_2$.** — ⟨T. **4**.3⟩ — Cryst. w. 2 or 3 H_2O in deliq. *red* ndl. — Red. to sulphanilic ac., No. **54**.1955, by $SnCl_2$. — $Ba\bar{A}$: or.-yel. warts; alm. i. c. aq. — Chloride: red lft. fr. bz.; m.p. 222°; 170°. — Amide: yel.-red cryst.; does not melt @ 300°; carbonizes fr. 250°.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN AND SULPHUR. — SOLIDS.
1360	166–7 sl.d.	**Rhodaninic Ac., Rhodanin,** $\ulcorner CH_2.CO.NH.CS.S \urcorner$. — *Pale yel.* tbl. fr. h. aq. — Reacts acid to litmus. Taste, bitter. — V.d.s. c. aq.; more s. h. aq.; e.s. alc., eth., Na_2CO_3, ammonia, or alk. sol. — Pptd. unchanged by ac. fr. alk. sol. — $FeCl_3$ gives brown-red ppt. containing rhodonin-red in boiling aq. sol. (J. pr. [2,] **16**, 8). — (Fr. chloracetic ac. & NH_4SCN). — Heating NaOH sol. gives NaSCN.
	167–72°(sl.h.)	**Thiourea.** — Cf. No. **54**.1480.
1365	169–70; 171	**Benzoylthiourea,** $Ph.CO.NH.CS.NH_2$. — ⟨§⟩ — Cryst. fr. dil. alc. — D.s. c. aq.; s. alc.; i. eth. — Taste v. bitter. — (Aq. @ 140° gives benzoic ac., NH_3, CO_2, H_2S.)
1370	169–70; 171	**o-Anisolesulphonamide,** $MeO.C_6H_4.SO_2NH_2$. — ⟨**⟩ — Ndl. — E.s. h. aq.
1375	171; 169–70; 173	**Acetylphenylthiourea,** $NH(C_2H_3O).CS.NHPh$. — Tbl. fr. dil. alc. — Alm. i. aq.; mod. s. alc., eth.; s. in 2 mol. dil. alk. — Conc. alk. gives phenylthiourea, No. **54**.1205, & acetanilide, No. **2**.1975.
1380	172; 174; 169–71	**Piperidine Piperidyldithiocarbamate,** $C_5H_{10}:N.CS.SH_2N:C_5H_{10}$. — ⟨G.O.-G.⟩ — Colorless tbl. fr. alc. — E.s. c. aq.
1385	172	**Bis-p-toluenesulphonyl-m-phenylenediamine,** $(C_6H_4Me.SO_2NH)_2.C_6H_4$. — ⟨**⟩ — Ndl. — E.s. alc., gl. ac. ac. — Saponified by c. conc. H_2SO_4. — (Fr. m-phenylenediamine & sulphonylchloride in pyridine).
1390	172	**2-Nitro-1,3-dimethylbenzene-4-sulphonamide,** $(NO_2)Me_2.C_6H_2.SO_2NH_2$. — ⟨**⟩ — Cryst. — E.s. alc., eth. — Corresp. ac.: v.s. aq.; m.p. (anhydr.) 144°.
1395	170–5d.	**Ethyl Dithioallophanate,** $NH_2.CS.NH.CO.SEt$. — Pearly cryst. — I. c. aq.; s.h. eth.; more s.h. alc. — $Ba(OH)_2$ in cold splits to ethylmercaptan, No. **7**.1355, CO_2 & thiourea, No. **54**.1480. — (Fr. HCl, KSCN & alc.)
1400	173.5	**Thioformo-p-toluide,** $C_7H_7NH.CHS$. — Cryst. fr. alc.
1402	172–7	**4-Nitro-2-sulphaminobenzoic Ac.,** $(NO_2)(NH_2.SO_2).C_6H_3.CO_2N$. — ⟨T. **4**. 3⟩ — N. Eq. 246. — Cryst. gran. fr. aq. — R.d.s. aq.; e.s. alc.; s. eth. — (@ 177° gradually gives anhydride: m.p. 209°.)
1405	174	**Py-2-Thioquinoline,** $\ulcorner C_6H_4.CH:CH.C(SH):N \urcorner$. — *Yel.* lft. fr. 45% alc. — I. c. aq.; e.s. h. alc., eth., bz., chlf., CS_2; s. acids & alk. — H_2O_2 gives a sulphide of m.p. 137°, (Ber. **21**, 622).
1410	174	**α-Thiophenecarbonamide,** $C_4H_3S.CONH_2$. — ⟨T. **4**.4⟩ — Cryst. powd. fr. h. eth. — Corresp. ac.: m.p. 126.5°, No. **7**.835; ndl. fr. h. aq.
1415	175	**2-Toluidine-4-sulphonamide,** $Me,NH_2.C_6H_3.SO_2NH_2$. — ⟨**⟩ — Cryst. — E.s h., d.s. c. aq.; i. eth., bz., NH_3; d.s. alc. — Corresp. ac.: s. in 100 pt. c. aq., sol. being colored dark violet by $FeCl_3$.
1420	175–6	**Guanylphenylthiourea,** $NH_2.NH:C.NH.CS.NHPh$. — Cryst. fr. alc. — E.s. alk. w. alk. react.! — Boiling w. HCl gives CO_2, H_2S, aniline, No. **2**.1235, & guanidine.
1425	174; 179	**o-Thiocarbamidothiophenol, Benzothiazole Mercaptan,** $\ulcorner C_6H_4.N:C(SH).S \urcorner$. — Lust. ndl. or lft. fr. alc. — I. aq., s. alc., eth., gl. ac. ac.; v.s. alk. — Taste v. bitter! — (Fr. act. of heat on phenylmustard oil & S.)
1430	176	**Chrysyl Mustard Oil,** $C_{18}H_{11}N : CS$. — Pale greenish ndl. fr. gl. ac. ac. — D.s. alc., eth.
1435	172; 178–9	**1,4,6-Trimethylbenzene-6-sulphonamide,** $Me_3.C_6H_2.SO_2NH_2$. — ⟨**⟩ — Fine pr. fr. aq. — D.s. aq.; e.s. alc.
1440	176	**Di-p-tolylthiourea,** $CS.(NH.C_7H_7)_2$. — ⟨§⟩ — Large cryst. — I. aq.; v.d.s. c. alc. — Treated w. HgO in alc. sol. gives ditolylurea, No. **2**.2608. — (By boiling p-toluidine w. CS_2 & alc.)
1445	176	**Diphenylthiohydantoin,** $\ulcorner NPh.CO.CH_2.S.C:NPh \urcorner$. — Lft. — Sbl. w. decn. — I. aq.; d.s. eth.; e.s. h. alc.; s. min. acids & repptd. by aq. — Long boiling w. alc.-KOH gives carbanilide, No. **2**.2580 & thioglycollic ac.
1450	176–7	**Phenol-p-sulphonamide,** $HO.C_6H_4.SO_2NH_2$. — ⟨**⟩ — Cryst. fr. aq. or alc.
1455	177	**1,2,3,4-Tetramethylbenzene-5-sulphonamide,** $Me_4.C_6H.SO_2NH_2$. — ⟨**⟩ — Glassy pr. fr. alc. — Alm. i. c. aq.; d.s. c. alc.; e.s. bz.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
1460	177–8	**p-Nitrothiourethane, $(NO_2)C_6H_4.NH.CS.OEt$.** — *Yel.* ndl. — I. aq.; e.s. alc. — (Fr. p-nitraniline, CS_2 & alc.)
1465	177.5	**β-Naphthalenesulphonic-α-naphthalide, $C_{10}H_7SO_2.NH(C_{10}H_7)$.** — ⟨**⟩ — Ndl.
1470	178	**Phenylthiohydantoin, $C_9H_8N_2SO$.** — Ndl. — Alm. i. c. aq.; s. h. aq.; d.s. c. alc.; e.s. eth., acids. — NaOH gives cryst., v.s. Na salt, fr. wh. acid ppts. orig. comp.
1475	178–9	**Dibenzoylsulphonyl-3,4-toluylenediamine, $Me.C_6H_3(NH.SO_2Ph)_2$.** — ⟨**⟩ — Lft. fr. alc.
1480	180 r.h.; (abt. 167–72°, slow heating)	**Thiourea, $(NH_2)_2CS$.** — ⟨§⟩ — Rhomb. cryst. or pearly ndl. — S. in 11 pt. c. aq.; alm. i. c. alc., eth. — By fusion is largely transformed to NH_4NCS. Hence solution of fusion gives red color w. $FeCl_3$ sol.! & m.p. after slow fusion may be found 10° or more too low! — Combines w. acids & met. salts to great variety of addition products. — For delicate color react. w. ferrocyanide, cf. Biochem. Z. **23**, (1910) 45. (or Rosenthaler p. 661).
1485	180	**Thiodiphenylamine, Phenthiazine, $\ulcorner S.C_6H_4.NH.C_6H_4 \urcorner$.** — B.p. 371°. — Lust. yellowish lft. fr. alc. — Sbl. in lft. — D.s. c. alc.; e.s. bz.; v.d.s. lgr.; mod. s. c. eth. — $FeCl_3$ colors alc. sol. dark green! — HNO_3 has same effect on gl. ac. ac. sol. — Ignition w. Zn dust gives diphenylamine, No. **2**. 1568. — "*Charac. react.*" — Mix little comp. w. few drops gl. ac. ac. & then w. few drops HNO_3. Add some aq. & boil w. $SnCl_2$ sol. Remove Sn fr. colorless sol. by Zn. Add $FeCl_3$. A red-violet ppt. forms, dissolving w. red-violet color on diluting. (Ber. **16**, 2898, Ann. **230**, 84.) — (Fr. S & diphenylamine.)
1490	180–1	**1-Naphthylamine-7-sulphonamide, $NH_2.C_{10}H_6.SO_2NH_2.1\frac{1}{2}H_2O$.** — ⟨**⟩ — Fine yel. ndl. — Acetyl deriv.: ndl. fr. aq.; m.p. 213°. — Corresp. ac.: sol. in abt. 200 pt. c. aq.; $FeCl_3$ giving blue sol.
1495	180	**Bis-Phenylaminophenylthiourea, $(PhNH.C_6H_4NH)_2CS$.** — ⟨§⟩ — Ndl. fr. dil. alc. — (Fr. CS_2 & p-aminodiphenylamine.)
1500	180.5; 168–70	**p-Nitrophenyl Disulphide, $(NO_2.C_6H_4)_2S_2$.** — Pr. fr. gl. ac. ac. — W. Zn dust & gl. ac. ac. gives p-nitrothiophenol, No. **54**.320,
1505	181	**Pseudocumene-5-sulphonamide, $Me_3.C_6H_2.SO_2NH_2$, (Me_3 = 1,2,4).** — Lft. — S. in 7000 pt. aq. @ 0° or 380 pt. @ 100°; s. in 4.4 pt. boiling alc.
1507	181	**Thiosemicarbazide, $NH_2.CS.NH.NH_2$.** — Long ndl. fr. aq. — Hydrochloride: m.p. 186–90°; s. in abt. 4 pt. aq.
1510	181–2	**α-Nitroanthraquinonedisulphonic Ac., $NO_2.C_{14}H_5O_2.(SO_3H)_2$.** — ⟨T. **4**.3⟩ — N. Eq. 206.5. — *Yel.* pr. fr. alc. or gl. ac. ac. — E.s. aq.; i. eth., chlf., lgr.
1520	180; 186	**Benzothiazolyl Disulphide, $[\ulcorner C_6H_4.S.CS.N \urcorner]_2$.** — Silvery scales fr. bz. — I. alc., alk. — Boiled w. alc.-KOH gives corresp. mercaptan: m.p. 179°.
1525	185	**3-Sulphamino-p-toluic Ac., $NH_2.SO_2.C_6H_3Me.CO_2H$.** — ⟨T. **4**.3-b.⟩ — N. Eq. 215. — Long cryst. fr. aq. — V.d.s. alc., eth., chlf.; d.s. bz. — MeA: ndl. ; m.p. 145°.
1530	185	**1-Nitronaphthalene-8-sulphonamide, $NO_2.C_{10}H_6.SO_2NH_2$.** — ⟨**⟩ — Silky pr. fr. alc. — 100 pt. abs. alc. @ 24° dis. 0.34 pt., or 2.2 pt. @ boiling temp. — E.s. chlf., acetone.
1535	185–6	**Toluene-2,4-disulphonamide, $Me.C_6H_3.(SO_2NH_2)_2$.** — ⟨**⟩ — Pr. — S. h. aq.; e.s. alc.; v.s. ammon. — Corresp. ac.: thick liq.
1540	186	**Pentamethylbenzenesulphonamide, $Me_5.C_6.SO_2NH_2$.** — ⟨**⟩ — Glassy pr. fr. alc. — R.d.s. c. alc.; s. alk.
1545	186	**o-Nitrobenzenesulphonamide, $NO_2.C_6H_4.SO_2NH_2$.** — ⟨**⟩ — Ndl. — V.d.s. c. aq., e.s. h. alc. — (Free acid not described.)
1550	186	**4-Nitrotoluene-2-sulphonamide, $NO_2.C_6H_3Me.SO_2NH_2$.** — ⟨**⟩ — Long ndl. D.s. c. aq., alc., eth. — Corresp. ac.: s. aq.; m.p. 130°.
1555	186	**β-Naphthylthiourea, $C_{10}H_7NH.CS.NH_2$.** — ⟨§⟩ — D.s. lft. fr. alc.
1560	186–7	**Di-o-xylylthiourea, $(Me.C_6H_4.CH_2.NH)_2.CS$.** — ⟨§⟩ — Lust. lft. — (Fr. long boiling of the amine w. CS_2 + abs. alc.)
1565	186.5	**Tetramethyldiaminodiphenylthiourea, $(NMe_2.C_6H_4.NH)_2.CS$.** — ⟨§⟩ — Ndl.

No.	Melting-point (C.°)	**“ADDITIONAL ELEMENTS” — NITROGEN AND SULPHUR. — SOLIDS.**
		fr. bz. — I. aq.; e.s. dil. acids; alm. i. c. alc.; s. h. bz. — V. stable. — Acetylation w. ac. anhydr. gives cryst. deriv.: m.p. 71°. — (Fr. alc., CS_2 & dimethyl-p-phenylenediamine).
1570	188; 182	**p-Tolylthiourea, $NH_2.CS.NH.C_7H_7$.** — ⟨§⟩ — Tbl. fr. alc. — D.s. c. aq.; s. h. alc.
1575	188	**1-Nitronaphthalene-4-sulphonamide, $NO_2.C_{10}H_6.SO_2NH_2$.** — ⟨**⟩ — Octahedra or scales.
1580	190	**p-Aminophenylthiourea, $NH_2.CS.NH.C_6H_4.NH_2$.** — Ndl. fr. aq. — V.d. s. c. aq. or alc., mod. s. h. aq. — Above m.p. gives NH_3 & p-phenylene-dithiourea, No. **54**.1740.
1585	190–1	**Dehydrothio-p-toluidine, ⌜$C(C_6H_4.NH_2) : N.C_6H_4.S$⌝.** — B.p. 434°. — Lust. nearly colorless ndl. fr. alc. — S. in 20,000 pt. h. aq.; e.s. gl. ac. ac.; d.s. c. alc.; s. eth., bz. — Alc. sol. fluoresces violet-blue! Sol. in conc. warm HCl, orange; pptd. by aq., pale yellowish. — Ignition w. Zn dust gives p-toluidine! No. **2**.566. — (KOH fusion gives aminobenzoic ac. & aminothiocresol) — Acetyl deriv.: pr. fr. alc.; m.p. 225°, 227°, d.s. ac. ac.; alm. i. alc.
1590	191–2	**3-Nitro-1,4-dimethylbenzene-2-sulphonamide, $NO_2.C_6H_2Me_2.SO_2NH_2$.** — ⟨**⟩ — Flat lust. ndl. fr. 50% alc. becoming opaque @ 170°. — (Corresp. ac.: v.s. aq.).
1595	192	**s-Diacenaphtenylthiourea, $(C_{12}H_9NH)_2CS$.** — ⟨§⟩ — Ndl. fr. toluene. — Boiled w. aniline gives aminoacenaphthene & diphenylthiourea, No. **2**.1180.
1600	d.193	**Aminomethylsulphurous Ac., $NH_2.CH_2.O.SO_2H$.** — Cryst. fr. aq. — D.s. c. aq.; alm. i. alc. — Boiled w. aq. gives SO_2! — NaOH sol. gives NH_3!
1605	193	**2,4-Tetranitrophenyl Sulphide, $[(NO_2)_2.C_6H_3]_2S$.** — *Yel.* ndl. fr. gl. ac. ac. — Alm. i. alc., bz., CS_2.
1610	193	**o-Dinitrophenyl Disulphide, $(NO_2.C_6H_4)_2S_2$.** — Fine *yel.* ndl. fr. gl. ac. ac. — V.d.s. gl. ac. ac., alc. — V. stable to acids & alkalies.
1615	193	**Ethylenediphenyldithiourea, $C_2H_4(NH.CS.NHPh)_2$.** — Scales. — I. alc., eth., bz.; d.s. gl. ac. ac. — Fusion gives thiocarbanilide, No. **54**.1180. — (Fr. ethylenediamine + x.s. phenylmustard oil).
1620	193; 196	**Thiocarbamidophenol, o-⌜$C_6H_4.O.C(SH).N$⌝.** — Ndl. fr. aq. — Alm. i. c. aq.; s. h. aq.; d.s. alc.; e.s. eth., ammon. — HCl @ 170° dec. to CO_2, o-aminophenol, No. **2**.938, & mercaptan. — (Fr. CS_2 & o-aminophenol.)
1625	194	**Ethylenethiourea, ⌜$CH_2.CH_2.N{:}C(SH).NH$⌝.** — Pr. — E.s. alc.; d.s. eth. — Taste v. bitter. — (Fr. ethylenediamine, CS_2 & aq.).
1630	194.5–5.5	**Tetraphenylthiourea, $Ph_2N.CS.NPh_2$.** — Glassy ndl. — I. aq.; v.d. s. c. alc.; mod. s. eth.; v.s. bz.; i. alk. — Dry distn. gives diphenylamine, No. **2**. 1568!
1635	195	**Bis-p-aminophenylthiourea, $CS[NH.C_6H_4.NH_2]$.** — Colorless ndl. — D.s. h. alc. & aq.; e.s. dil. min. ac. or ac. ac. — (Pat.). — (Fr. p-phenylenediamine & CS_2).
1640	196	**1,2,3-Trimethylbenzene-5-sulphonamide, $Me_3.C_6H_2.SO_2NH_2$.** — ⟨**⟩ — Short pr. fr. alc.
1645	196	**Dimesitylthiourea, $SC.(NH.C_6H_2.Me_3)_2$, ($NH{:}Me_3$ = 2:1,3,5).** — ⟨§⟩ — Ndl. fr. alc. — (Fr. mesidine & CS_2.)
1650	197	**Dinitrosulphobenzid, $(NO_2.C_6H_4)_2.SO_2$.** — Rhomb. tbl. — V.d.s. alc.; d.s. eth.; e.s. h. gl. ac. ac.
1655	193–204 d.	**p-Aminodimethylanilinethiosulphonic Ac., $NH_2.C_6H_3(NMe_2).S.SO_3H$.** — Cryst. — S. in 270 pt. c., or 25–30 pt. h. aq. — D.s. alc.; e.s. alk. — Aq sol. soon becomes blue, or colored purple-red, by trace of $K_2Cr_2O_7$!
1660	197–8	**5-Nitro-1,4-dimethylbenzene-2-sulphonamide, $NO_2.C_6H_2Me_2.SO_2NH_2$.** — ⟨**⟩ — Flat lust. ndl. fr. 50% alc. — (Corresp. ac.: v.s. aq.).
1665	198	**α-Naphthylthiourea, $NH_2.CS.NH.C_{10}H_7$.** — ⟨§⟩ — Pr. fr. alc. — D.s. aq., eth., c. alc.; mod. s. h. alc.
1670	198; 203c.	**s-β-Dinaphthylthiourea, $CS(NH.C_{10}H_7)_2$.** — ⟨§⟩ — Lft. — Generally v.d.s.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
1675	d.200	**Nithialin, $C_{12}H_{16}N_4SO$.** — *Yel.* amorph. powd. — I. aq.; v.d.s. alc., i. eth., chlf. — Sol. in. conc. H_2SO_4, pptd. unch. by aq. — (Decd. by boiling alc.-KOH). — (Fr. alc., $(NH_4)_2$ S & m-dinitrobenzene).
1677	d. abt. 200	**Glycolylthiourea, Thiohydantoin, ⌜$CS.NH.CO.CH_2.NH$⌝.** — Ndl. fr. h. aq. — D.s. c. aq.; i. alc., eth. — W. alc.-ammon. @ 130° gives NH_4SCN, etc.
1680	200–1 sl.d.	**Phenylthiosemicarbazide, $NH_2.CS.NH.NH.Ph$.** — Monoclin. pr. — Taste of aq. sol. v. bitter. — D.s. aq., eth., chlf., bz.; more s. h. alc.; e.s. warm KOH sol. — Gives white unstable ppt. w. ammon. $AgNO_3$. — (Unchanged by boiling w. dil. acids.)
1681	202–3	**2-Sulphamino-m-toluic Ac., $NH_2.SO_2.C_6H_3.Me,CO_2H$.** — ⟨T. **4**.4-b⟩ — N. Eq. 215. — Fusion w. alk. gives 2-hydroxy-m-toluic ac.
1682	202	**Tetramethyldiaminothiobenzophenone, $[NMe_2.C_6H_4]_2.CS$.** — *Ruby-red* cryst. or *cantharides-green* cryst. powd.! — 100 pt. alc. @ 18° dis. 0.072 pt.; 100 pt. alk., 0.27 pt.; 100 pt. chlf., 4.58 pt.; e.s. bz., gl. ac. ac. — CS_2 sol. dark red or grass green by reflected light. Sol. in conc. HCl w. much aq. becomes dark green! — Heated w. dil. HCl dec. to H_2S & Michler's ketone, No. **2**.2317. — (Many patents.)
1683	202	**o-Sulphaminobenzoic-p-toluide, $NH_2SO_2.C_6H_4.CO.NH.C_6H_4Me$.** — ⟨**⟩ — Short ndl.
1685	203	**2,6(?)-Dinitrotoluene-4-sulphonamide, $(NO_2)_2.C_6H_2Me.SO_2NH_2$.** — ⟨**⟩. — Lft. — Corresp. Ac.: v.s. aq.; m.p. (anhydr.) 165°; No. **54**.1335.
1690	203; 207.5c.	**s-Di-α-naphthylthiourea, SC : $(NH.C_{10}H_7)_2$.** — ⟨§⟩ — Lust. ndl. fr. nitrobenzene. — Alm. i. c. eth., CS_2, bz.; v.d.s. h. alc., or h. gl. ac. ac.
1695	203	**Benzidinemustard Oil, $C_{12}H_8(N.CS)_2$.** — ⟨‡⟩ — Ndl. fr. bz. — I. alc.; d.s. eth.; e.s. h. bz.
1697	209	**p-Nitrobenzoic Acid Sulphinide, p-Nitrosaccharine, ⌜$C_6H_3(NO_2).CO.NH.-SO_2$⌝.** — Small lft. or ndl. of v. bitter taste! — D.s. c. aq., eth.; r.d.s. alc.
1698	204	**p-Nitrobenzylsulphonamide, $NO_2.C_6H_4.CH_2.SO_2NH_2$.** — ⟨**⟩ — Pr.
1699	206–7	**2-Nitroaniline-4-sulphonamide, $(NO_2)(NH_2).C_6H_3.SO_2NH_2$.** — ⟨**⟩ — *Yel.* cryst. fr. aq. — Corresp. ac.: v.s. aq.
1700	206	**1-Naphthylamine-4-sulphonamide, $NH_2.C_{10}H_6.SO_2NH_2$.** — ⟨**⟩ — Yellowish ndl. fr. alc. — Acetic anhydr. gives acetyl deriv.: ndl. fr. alc.; m.p. 241°.
1705	212(217c.)	**β-Naphthalenesulphonamide, $C_{10}H_7.SO_2.NH_2$.** — ⟨**⟩ — Lft. — D.s. aq., eth.
1710	213.5–15	**Diacetylthioaniline, $[C_6H_4.NH(C_2H_3O)]_2S$.** — Fine ndl. fr. alc. — E.s. h. alc.; d.s. eth.; alm. i. aq.
1712	215–7; 213–4; 205.	**Dithioacetanilide, $(C_2H_3O.NH.C_6H_4)_2S_2$.** — Indistinct lft. fr. gl. ac. ac. — S. in alc. & gl. ac. ac. only.
1715	215	**m-Phenylenedithiourea, $C_6H_4.(NH.CS.NH_2)_2$.** — Lft. fr. dil. Na_2CO_3 sol. E.s. alk.; repptd. by acids. — (S-color intermed. D.R.P. 139429.)
1720	216	**Tetramethyldiaminodiphenylmethanesulphone, $C_{17}H_{20}N_2SO_2$.** — ⟨*⟩ — Lft. fr. alc. — Turns green in air. — (Pat. Frdl. II, 59).
1725	217	**p-Diaminodiphenylmethanesulphone, $C_{13}H_{12}N_2SO_2$.** — ⟨*⟩ — Lust. lft. — Colored deep blue by HNO_2!
1730	218–9d.	**1-Naphthylamine-6-sulphonamide, $NH_2.C_{10}H_6.SO_2NH_2$.** — ⟨**⟩ — Silky ndl. fr. alc. — D.s. alc. — Corresp. ac.: s. in 1000 pt. c. aq., its sol. soon coloring cornflower-blue w. 1 drop $FeCl_3$ sol.
1735	218	**p-Sulphocinnamic Ac. Amide, $NH_2.SO_2.C_6H_4.CH : CH.CONH_2$.** — ⟨**⟩ — Cryst. fr. h. aq. — E.s. h. aq. — CrO_3 mixt. oxid. to p-sulphaminobenzoic ac., No. **54**.1930.
1740	218	**p-Phenylenedithiourea, $C_6H_4.(NH.CS.NH_2)_2$.** — ⟨§⟩ — Sm. ndl. fr. dil. NH_3. — D.s. alc.
1744	219–20; 185–6.	**o-Sulphobenzamide, $HSO_3.C_6H_4.CONH_2$.** — ⟨T. **4**.3-b & **4**.8⟩ — Pr. — E.s. aq., alc. — $NH_4\bar{A}$: ndl.; e.s. aq., alc.; m.p. 256–7°.
1745	abt. 220 sl. d.; 224 sl.d. (r.h. to 200)	**Saccharin, o-Benzoic Ac. Sulphinid, ⌜$CO.C_6H_4.SO_2.NH$⌝.** — ⟨*⟩ — Colorless cryst. fr. acetone. — Sbl. — S. in 290 pt. c. aq., or 25 pt. boiling aq., or 31 pt. c. alc., s. eth. — Sol. in 10,000 pt. aq. of abt. same sweetness as sol. of cane sugar in 20 pt. aq. — Sat. aq. sol. acid to litmus. — E.s. NaOH,

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
		Na_2CO_3, $NaHCO_3$ or ammon. sol., forming sol. salt of o-sulphamidobenzoic ac., $Na\bar{A}.2H_2O$, (from wh. min. acids reppt. the anhydride saccharin): tbl.; v.s. aq.; v.d. s. c. alc. — Fuse at low temp. w. 5 pt. NaOH until NH_3 ceases to be given off. Dis. in aq. Exactly neut. w. dil. HCl & filter. Add a drop $FeCl_3$ sol. to filtrate. A violet color appears. (Formation of salicylic ac. or phenol.) (U.S.P.). — (Cf. Rosenthaler, p. 656, for other reactions.)
1750	222 (frothing)	**Dihydroxyphenylthiourea, $(HO.C_6H_4.NH)_2CS$.** — Pearly lft. fr. alc. — D.s. c., e.s. h. aq.; v.e.s. alc., alk. — (Fr. p-aminophenol & CS_2.)
1755	223	**1-Nitronaphthalene-7-sulphonamide, $NO_2.C_{10}H_6.SO_2NH_2$.** — ⟨**⟩ — Yel. pr. fr. alc.
1760	224	**Toluene-2,5-disulphonamide, $Me.C_6H_3(SO_2NH_2)_2$.** — ⟨**⟩ — Pr. — D.s. aq.
1765	225	**1-Nitronaphthalene-3-sulphonamide, $NO_2.C_{10}H_6.SO_2NH_2$.** — ⟨**⟩ — Ndl.
1770	225	**1-Nitronaphthalene-5-sulphonamide, $NO_2.C_{10}H_6.SO_2NH_2$.** — ⟨**⟩ — *Yellowish* flat pr. — I. aq.; d.s. c. alc., eth.; more s. h. alc.
1775	226	**Picryl Sulphide, $[C_6H_2(NO_2)_3]_2S$.** — *Golden* lft. fr. gl. ac. ac. — V.d.s. alc., eth., chlf., lgr.; v.s. acetone.
1780	228	**p-Diphenylthiourea, $(C_{12}H_9NH)_2.CS$.** — ⟨§⟩ — Lft. — I. ord. solv. — (Fr. CS_2 & p-aminobiphenyl).
1785	227–30	**Diphenylsulphonamide, $C_6H_5.C_6H_4SO_2.NH_2$.** — ⟨**⟩ — Globular aggreg. of fine ndl. fr. abs. alc. — E.s. eth., CS_2; alm. i. bz. — (Corresp. ac., not described.)
1790	229	**m-Benzenedisulphonamide, $C_6H_4.(SO_2NH_2)_2$.** — ⟨**⟩ — Ndl.
1795	232	**Dibenzenesulphonylbenzidine, $(PhSO_2.NH.C_6H_4\text{-})_2$.** — ⟨**⟩ — Cryst. — V.d.s. — (Fr. benzidine + $PhSO_2Cl$ + NaOH.)
1800	232d.	**2-Thiocarbamino-1-thionaphthol, ⌜$C_{10}H_6.S.C(SH) : N$⌝.** — Mic. ndl. — E.s. alc., eth., bz. — Alk. K_3FeCy_6 oxidn. gives a disulphide: ndl. fr. chlf.; m.p. 180°.
1805	228: abt. 245	**Dibenzenesulphonylhydrazide, $(Ph.SO_2)_2N_2H_2$.** — ⟨**⟩ — Lust. ndl. — V.d. s. aq., alc. Has reducing properties. — Boiled w. alk. dec. to N_2 & benzenesulphinic ac., No. **7**.460.
1810	236	**(α)-Thio-β-dinaphthylamine, ⌜$S.C_{10}H_6.NH.C_{10}H_6$⌝.** — *Pale yel-green* ndl. softening @ 232°. — S. eth., h. bz. — S. oil of vit. w. violet color. — $\bar{B}$.2Pk: yel. ndl.; ndl. ; alm. i. alc., eth.; d. abt. 265°.
1815	235–9 sl.d.	**Toluene-3,4-disulphonamide, $Me.C_6H_3.(SO_2.NH_2)_2$.** — ⟨**⟩ — E.s. aq., alc.
1820	238	**Chrysylthiourea, $C_8H_{11}NH.CS.NH_2$.** — ⟨§⟩ — Thick cryst. — Alm. i. eth., CS_2, bz.
1825	238	**Triphenylthioammelin, ⌜$C(SH).NPh.C(NPh).NH.C(NPh).N:$⌝.** — Lft. fr. chlf. — V.d.s. alc.; s. chlf.; s. KOH sol. & repptd. by CO_2. — $Ag\bar{A}$: egg-yel. amorph. ppt.
1830	240–3	**Pinacolylthiourea, ⌜$CS.NH.(CMe_2)_2.NH$⌝.** — Mic. pr. — Alm. i. aq.; e.s. h. alc., eth., chlf., acids. — (Fr. acetone, CS_2 & ammonia.)
1835	242	**Nitrobenzene-3,5-disulphonamide, $NO_2.C_6H_3(SO_2NH_2)_2$.** — ⟨**⟩ — Lft. — Corresp. ac.: deliq. — Corresp. chloride: m.p. 96°.
1840	242	**α-2,7-Naphthalenedisulphonamide, $C_{10}H_6(SO_2NH_2)_2$.** — ⟨**⟩ — Lust. ndl. — Mod. s. h. aq., alc.
1845	246–7d.	**m-Sulphaminobenzoic Ac., $NH_2SO_2.C_6H_4.CO_2H$.** — ⟨T. **4**.3-b⟩ — N. Eq. 201. — Scales fr. h. aq.
1850	249–50; 246	**p-Toluylsulphinid, "Methylsaccharine," ⌜$C_6H_3Me.CO.NH.SO_2$⌝.** — ⟨*⟩ — Long ndl. fr. aq. — V.d.s. c. aq.; e.s. alc., eth., bz., alk. — Taste v. sweet, later bitter!
1855	249	**1,3-Dimethylbenzene-2,4-disulphonamide, $Me_2.C_6H_2.(SO_2NH_2)_2$.** — ⟨*⟩ — Corresp. ac.: deliq.
1860	250d.	**β-1-Nitroanthraquinone-2-sulphonic Ac., $NO_2.C_{14}H_6O_2.(SO_3H)$.** — ⟨T. **4**.3 & **4**.8⟩ — Indistinct cryst. powd. — E.s. aq., alc. — (Strong acid) — Aq. sol. reddened by alk. — $Ba\bar{A}_2.3\frac{1}{2}H_2O$: pale yel.-red ndl.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.
1865	254c.	**6-Sulphamino-m-toluic Ac., $NH_2.SO_2.C_6H_3.Me,CO_2H$.** — ⟨T. **4**.3 & **4**.8⟩ — N. Eq. 215. — Long ndl. fr. aq. — 100 pt. aq. @ 15° dis. alm. 2 pt.; r.d.s. alc., eth.; i.c. chlf. — KOH fusion gives 6-hydroxy-m-toluic ac. — $Ba\bar{A}_2.4H_2O$: ndl.; e.s. aq.
1870	255d.	***α*-1-Nitroanthraquinone-2-sulphonic Ac., $NO_2.C_{14}H_6O_2.SO_3H$.** — ⟨T. **4**.3 & **4**.8⟩ — Small yellowish lft. fr. dil. HNO_3. — D.s. c. aq.; e.s. h. aq. — Aq. sol. reddened by alk. — $Na\bar{A}.H_2O$: ndl. — $Ba\bar{A}_2$: ppt. of ndl. — Chloride, $C_{14}H_6NSO_6Cl$: yellowish ndl.; m.p. 194°.; alm. i. alc., eth.; e.s. h. toluene;. v. stable to c. aq.
1880	257d.	**Dimethylanilinesulphonic Ac., $Me_2N.C_6H_4.SO_3H + H_2O$.** — ⟨T. **4**.3 & **4**.8⟩ — Lft.
1885	259–60	**1-Naphthylamine-5-sulphonamide, $NH_2.C_{10}H_6.SO_2NH_2$.** — ⟨**⟩ — Lust. tbl. fr. warm alc. — I. c. alc.; d.s. bz.; e.s. gl. ac. ac.
1890	261	**Anthraquinone-2-sulphonamide, $C_{14}H_7O_2.SO_2NH_4$.** — ⟨**⟩ — Long *yel.* ndl. fr. gl. ac. ac. — Alm. i. alc., toluene, chlf., CS_2. — (Is formed from corresp. chloride only by heating some hrs. @ 140° w. alc.-NH_3, (Ber. **13**, 692)).
1895	267	**2-Sulphamino-p-toluic Ac., $Me.C_6H_3(SO_2NH_2).CO_2H$.** — ⟨T. **4**.3 & **4**.8⟩ — N. Eq. 215. — Long ndl. — D.s. c. aq.; much more s. h.; e.s. alc.; v.d.s. eth. — Conc. HCl @ 220° gives p-toluic ac. (Vol. I).
1900	270d.	**Diethylanilinesulphonic Ac., $Et_2N.C_6H_4.SO_3H$.** — ⟨T. **4**.3 & **4**.8⟩ — Browns @ 250°. — $Ba\bar{A}_2.2H_2O$.
1905	273	**3,3¹-Azoxybenzenedisulphonamide, $(NH_2SO_2.C_6H_4)_2N_2O$.** — ⟨**⟩ — *Yel.* monoclin. pr. — V.d.s. h. aq., more s. alc. — Corresp. ac.: m.p. 125°; v.s. aq., alc., eth.
1910	273	**Naphthalene-1,4-disulphonamide, $C_{10}H_6(SO_2NH_2)_2$.** — ⟨**⟩ — Ndl. fr. dil. alc.
1915	275	**ms-Thioacridol, Thioacridone, $SC_{13}H_9N$.** — *Br.-yel.* ndl. w. $1H_2O$ of crystn., becoming dull brown-red @ 120° or over H_2SO_4. — D.s. h. alc.; s. acetone; e.s. warm 2% NaOH sol., but i. alk. carbonate. — Oxidg. agts. give acridone, No. **2**.3946. — (Fr. acridine & S. D.R.P. 122,607.)
1920	278	**Benzidine-2,2¹-disulphonamide, $(NH_2.C_6H_3(SO_2NH_2)-)_2$.** — ⟨**⟩ — Cryst. fr. aq. — I. eth., chlf. — Corresp. ac.: pr.; d.s. c. aq.; aq.-free carbonizes w. m. @ 175°.
1925	279	**p-Phenylenethiourea, $\ulcorner C_6H_4.NH.CS.NH \urcorner$.** — Mic. lft. — I. ord. solv.
1930	d.w.m.280	**p-Sulphamidobenzoic Ac., $NH_2SO_2.C_6H_4.CO_2H$.** — ⟨T. **4**.3 & **4**.8⟩ — N. Eq. 201. — Flat pr. fr. aq. — Alm. i. c. aq.; d.s. h. aq.; e.s. alc. — (PCl_5 @ 60° gives $PCl_3:N.SO_2.C_6H_4.COCl$: pr. fr. lgr.; m.p. 82°; v. unstable in moist air.
1935	Explodes abt. 280	**2,4-Tetranitrophenyl Disulphide, $[(NO_2)_2C_6H_3]_2S_2$.** — Alm. i. ord. solv.; e.s. h. aniline; mod. s. alk. sulphides or sulphydrates.
1940	280 (sl.h.)	**(*β*-)-Thio-*β*-dinaphthylamine, $\ulcorner S.C_{10}H_6.NH.C_{10}H_6 \urcorner$.** — Rap. heated, m.p. 307°. — Alm. i. alc., eth.; v.d.s. bz.
1943	283–5d. (r.h.)	**p-Aminobenzoic Acid Sulphinide, $\ulcorner C_6H_3(NH_2).SO_2.NH.CO \urcorner$.** — ⟨*⟩ — Ndl. fr. aq. — Taste, v. sweet! — I.c. aq.; r.d.s. alc., eth. — Solutions fluoresce dark blue! — $K\bar{A}.8H_2O$: crusts; v.s. aq.
1945	286	**Phenylhydrazine-p-sulphonic Ac., $NH_2.NH.C_6H_4.SO_3H + \frac{1}{2}H_2O$.** — ⟨T. **4**.3 & **4**.8⟩ — *Yel.* lft. fr. aq. — 100 pt. boiling aq. dis. abt. 3.5 pt. — Red. $AgNO_3$ sol.! — Boiled w. $CuSO_4$ sol. evolves all N.
1947	286–7d.	**1-Nitronaphthalene-3,6-disulphonamide, $NO_2.C_{10}H_5.(SO_2NH_2)_2$.** — ⟨**⟩ — Ndl. — V.d.s. h. aq.; more s. NH_3.
1950	288	**p-Benzenedisulphonamide, $C_6H_4.(SO_2NH_2)_2$.** — ⟨**⟩.
1955	Carbonizes at 280–300	**p-Aminobenzenesulphonic Ac., Sulphanilic Ac., $NH_2.C_6H_4.SO_3H + 2H_2O$.** — ⟨T. **4**.3-b & **4**.8⟩ — Rhomb. tbl. wh. soon effloresce. — S. in 166 pt. aq. (10°). Fusion w. KOH gives aniline, No. **2**.1235! — Alkali salts react neutral. — Br. aq. in x.s. gives heavy ppt. in aq. sol.! — [Warmed w. PCl_5 under benzene gives phosphanilidosulphonic ac. chloride ($SO_2Cl.C_6H_4.NH.POCl_2$): s. in h. bz.; m.p. 158°, (J. pr. ch. [2] **20**, 250).]

No.	Melting-point (C.°)	**"ADDITIONAL ELEMENTS" — NITROGEN AND SULPHUR. — SOLIDS.**
1960	abt. 290	**Diphenyl-o-phenylenedithiourea, $C_6H_4(NH.CS.NHPh)_2$.** — ⟨§⟩ — **Lft. fr.** alc. — Dec. on fusion to thiocarbanilide, No. **54**.1180, & o-phenylenethiourea, No. **54**.1965. — (Fr. phenylmustard oil & o-phenylenediamine).
1965	296–7	**o-Phenylenethiourea, $C_6H_4(NH)_2.CS$.** — ⟨§⟩ — **Lft. fr. ammon. — E.s. alc.;** less s. aq.
1967	297–9	**Terephthalsulphinide, $\ulcorner C_6H_3(CO_2H).SO_2.NH.CO \urcorner$.** — ⟨*⟩ — **Pr. fr. eth. —** Mod. s. c. aq.; d.s. eth. — Pptd. by $AgNO_3$.
1970	304	**Oxalaminothiophenol, $[\ulcorner N.C_6H_4.S.C : \urcorner\text{-}]_2$.** — Lust. lft. — Dist. alm. undecd. — I. most solvents. — Cryst. in mic. pr. fr. h. toluene. — Alc. sol. tastes intensely bitter! — S. conc. H_2SO_4 w. yel.-green color. — Heated w. KOH @ 200° dec. smoothly to oxal. ac. & 2-aminothiophenol, No. **54**.50. — (Fr. act. of S. on acetanilide, etc.)
1975	carbonizes a. 300	**Oxalylaminothionaphthol, $C_{22}H_{12}N_2S_2$.** — *Gold-yel.* lft. — Alm. i. alc., eth., bz.; s. warm $PhNO_2$. — Fusion w. KOH gives oxalic ac. & aminothionaphthol. — (Fr. S, & α-acetnaphthalide.)
1980	305	**3,3'-Azobenzenedisulphonamide, $(NH_2.SO_2.C_6H_4)_2.N_2$.** — ⟨**⟩ — *Yel.* ndl. fr. alc. — V.d.s. alc., etc. — Corresp. ac.: yellowish lft.; e.s. aq.; crystg. w. $5H_2O$.
1985	305; 306	**Thioquinanthrene, $C_{18}H_{12}N_2S_2$.** — Long lust. ndl. fr. gl. ac. ac. — Alm. i. alc.; d.s. h. gl. ac. ac., xylene. — Stable to oxid. agts. — Picrate: m.p. 281°. — (Fr. quinoline & S @ 180°.)
1990	310–15	**1,3,5-Benzenetrisulphonamide, $C_6H_3.(SO_2NH_2)_3$.** — ⟨**⟩ — Long silky ndl. — 1.5 pt. s. in 1000 pt. aq. @ 25°; s. alc.; less s. bz.; i. eth., chlf., lgr. — (Corresp. ac. deliq. solid).
1995	350	**Benzidinesulphone, $(NH_2.C_6H_3\text{-})_2SO_2$.** — ⟨*⟩ — *Yel.* lft. — I. h. aq., alc., eth., bz.

ANALYTICAL TABLES

OF

ORDER LIV

COMPOUNDS CONTAINING NITROGEN AND SULPHUR AS "ADDITIONAL ELEMENTS"

)IVISION B, LIQUID SPECIES.

No.	Boiling-point (C.°)	Specific Gravity	SPECIFIC NAMES. — Tests and Specific Characterizations.
2100	58–9		**Thionylmethylamine, MeN:SO.** — ⟨G.O.-L⟩ — Fumes in air. — Decd. by aq. to $MeNH_2$ (No. **2**.1059) & SO_2.
2105	73		**Thionylethylamine, EtN:SO.** — ⟨G.O.-L⟩ — Odor pungent. — Aq. dec. to SO_2 & $EtNH_2$ (No. **2**.1062).
2110	116.8c.	1.200 (17)	**Thiazole, ⌜N:CH.S.CH:CH⌝.** — Odor like pyridine. — B̆$_2$.H_2PtCl_6.$2H_2O$: sm. pr.; dec. abt. 250°; d.s. c. aq.; e.s. alc. — B̆.Pk: silky d.s. ndl.; m.p. 151°. — B̆.$HAuCl_4$: yel. ppt.; ndl. fr. alc.; m.p. 248–50° d. — Aq.-$HgCl_2$ sol. gives white indistinctly cryst. ppt. — C̆.H_2Cl_2, softening abt. 200°, melted & darkened @ 225°!
2115	130	1.069 (24/4)	**Methyl Thiocyanate, Me.SCN.** — ⟨G.O.-L⟩ — Odor alliaceous. — Heated @ 180–5° develops pungent odor of methylmustard oil. — Alc.-KOH gives NH_3, Me_2S_2, KCN, K_2CO_3. — Heated w. trace HCl, polymerizes,
2120	131–2 (th.i.)	1.003 (15)	**Ethyl Isothiocyanate, EtNCS.** — ⟨‡⟩ — M.p. = – 5.9°. — Odor v. pungent! — Blisters the skin! — Evapn. w. conc. NH_3 sol. gives ethylthiourea (No. **54**.750): ndl.; v.s. alc., aq.; m.p. 113°.
2125	132–3	1.151 (16)	**Acetyl Thiocyanate, MeCO.SCN.** — Odor extremely pungent. — Aq. gives acetic & thiocyanic ac. (Test aq. sol. w. $FeCl_3$ sol.).
2130	137		**Isopropyl Isothiocyanate, C_3H_7NCS.** — ⟨‡⟩ — Odor pungent & irritating.
2135	140 (770)	.919 (10)	**tert-Butyl Isothiocyanate, Me_3CNCS.** — Odor pleasant, aromatic. — M.p. = + 10.5°.
2140	143.6(th.i.)	1.010 (23/4)	**Ethyl Thiocyanate, EtSCN.** — ⟨G.O.-L.⟩ — Odor mild. — I. aq.; misc. alc., eth. — W. aq.-KOH in tube @ 100° gives Et_2S_2, KCN, KCNO. — "Alc.-KOH gives Et_2S_2, CO_2, NH_3, but *no* KSCN."
2145	150.7c.	1.029 (0); 1.020 (15)	**Allyl Isothiocyanate, Allyl or Ordinary Mustard Oil, CH_2:CH.-CH_2.NCS.** — ⟨‡⟩ — Odor v. pungent, irritating! — Alm. i. aq.; v.s. alc., eth. — Alc. sol. gives white ppt. w. $HgCl_2$, or black-brown ppt. w. $AgNO_3$ sol. — Solidif. below –80°. — Convert to allylthiourea (thiosinamin), No. **54**.340, m.p. 78.4°, by treatment w. aq.-NH_3 (T. **4**.14-a)!
2150	151	.963 (20)	**Isopropyl Thiocyanate, Me_2CH.SCN.** — ⟨G.O.-L.⟩.
2155	153	.991 (0)	**Propyl Isothiocyanate, C_3H_7N.CS.** — ⟨‡⟩ — Odor v. pungent.

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENTS " — NITROGEN AND SULPHUR. — LIQUIDS.
2160	159.5	.944 (12)	**sec-Butyl Isothiocyanate, C_4H_9NCS.** — ⟨‡⟩ — Odor pungent. — $[\alpha]_D$ = abt. + 53°.
2165	161	1.056 (15)	**Allyl Thiocyanate, C_3H_5SCN.** — ⟨G.O.-L.⟩ — Odor alliaceous. — Boiling changes to corresp. pungent mustard oil. —Alc.-KOH gives KSCN & C_3H_5SH.
2170	162	.964 (14)	**Isobutyl Isothiocyanate, C_4H_9NCS.** — ⟨‡⟩ — Odor pungent!
2175	163		**n-Propyl Thiocyanate, Et.CH_2.SCN.** — ⟨G.O.-L.⟩ — Odor unpleasant.
2180	167		**n-Butyl Isothiocyanate, C_4H_9NCS.** — ⟨‡⟩ — Odor pungent!
2185	174–6		**Isobutyl Thiocyanate, C_4H_9S.CN.** — ⟨G.O.-L.⟩.
2190	183–4	.942 (17)	**Isoamyl Isothiocyanate, $C_5H_{11}NCS$.** — ⟨‡⟩.
2195	193.4c.		**n-Amyl Isothiocyanate, C_4H_9NCS.** — ⟨‡⟩.
2200	197	.905	**Isoamyl Thiocyanate, $C_5H_{11}SCN$.** — ⟨G.O.-L.⟩.
2205	200 alm. undec.	1.236 (15)	**Thionylaniline, PhN:SO.** — ⟨G.O.-L.⟩ — Yel. oil. — S. **abs.** alc. — Aq. splits to aniline, No. **2**.1235, & SO_2!
2212	204–8		**Ethyl Ethylthiocarbamate, EtNH.CS.OEt.** — Odor, alliaceous! — Decd. by alk. or dil. ac. to alc., CO_2 H_2S & ethylamine, No. **2**.1062. — (Fr. ethyl mustard oil & alc. @ 110°.)
2213	210–5	1.036 (14°)	**Ethyl Allythiocarbamate, C_3H_5NH.CS.OEt.** — Odor alliaceous! — Gives ppt. w. $HgCl_2$. — (Fr. allyl mustard oil & alc. @ 100°.)
2215	216	.934 (15°)	**Tetraethylthiourea, CS.$(NEt_2)_2$.** — ⟨§⟩ — I. aq.; v.s. alc., eth., ac. — Strong stable base, blueing litmus & expelling NH_3 fr. salts. — Not at. by NaOH sol., but gives Et_2NH, No. **2**.1068–1 on fusion w. KOH. — Not at. by c. fuming HCl.
2220	220		**Thionyl-m-toluidine, Me.C_6H_4:NSO.** — ⟨G.O.-L.⟩ — Yel. oil.
2225	221 (th.i.)	1.1382 (15/15)	**Phenyl Mustard Oil, Phenyl Isothiocyanate, Thiocarbanil, C_6H_5N.CS.** — ⟨‡⟩ — Powerful, irritating mustard-like odor! — Vol. w. st. — I. aq. Convert to thiocarbanilide, No. **54**.1180, by gently heating 2 drops w. 2 drops aniline. Product solidifies on cooling and rubbing w. rod. Recryst. fr. alc. & determine m.p.
2230	230	heavier than aq.	**Benzothiazole, Methenylaminothiophenol, ⌜C_6H_4.S.CH : N⌝.** — Alm. i. aq., e.s. alc., CS_2. — "Reacts neut." — W. MeI @ 100° gives BMeI: ndl.; d.s. c. alc.; m.p. 210°.
2235	231c.	1.155 (17.5)	**Phenyl Thiocyanate, C_6H_5S.CN.** — ⟨G.O.-L.⟩ — Alc.-KSH gives KSCN & thiophenol easily.
2240	238		**Ethenylaminothiophenol, μ-Methylbenzothiazole, ⌜C_6H_4.S.-**CMe : N⌝.
2245	239		**o-Tolyl Isothiocyanate, Me.C_6H_4.N:C:S.** — ⟨‡⟩.
2250	240 (749)	1.146 (15)	**Ethanesulphonethylamide, $EtSO_2$.NHEt.** — ⟨**⟩.
2255	243	Heavier than aq.	**Benzyl Isothiocyanate, $C_6H_5CH_2$.NCS.** — ⟨‡⟩ — I. aq. — (Found in eth. oils). — W. ammon. gives benzylthiourea (No. **54**.1315): pr.; m.p. 161–2°, 164°; i.c. aq.; s. in 60 pt. c. alc.
2260	252		**Propenylaminothiophenol, μ-Ethylbenzothiazole, ⌜C_6H_4.S.CEt-:N⌝.**
2265	254 (771)	1.08 (15)	**Ethanesulphonediethylamide, $EtSO_2$.NEt_2.** — ⟨**⟩.
2270	255		**Methenylaminothiocresol, ⌜C_6H_3Me.S.CH : N⌝.** — M.p. 15°. — Salts w. acids unstable. — $B_2.H_2PtCl_6$: ndl.
2275	256	1.067 (15)	**β-Phenylethyl Isothiocyanate, $C_6H_5CH_2.CH_2$.NCS.** — ⟨‡⟩ — $[\alpha]_D$ = + 1°, 30′ in 1 dcm. tube. — Warmed w. alc.-NH_3 gives phenylethylthiourea: cryst.; m.p. 137°. — (In various essential oils.)

No.	Boiling-point (C.°)	Specific Gravity	" ADDITIONAL ELEMENTS " — NITROGEN AND SULPHUR. — LIQUIDS.
2280	265c.		**Ethenylaminothiocresol, ⌐C_6H_3Me.S.CMe:N¬.** — Liq. — **B.**-$HAuCl_4$: ppt.
2285	272d.		*α*-**Naphthylsulphamidic Ac., " Thionaphthamic Ac.", $C_{10}H_7$NH.-SO_3H.** — Ndl. fr. warm aq. — Becomes violet in light. — Unstable, soon decg. to *α*-naphthylamine, No. **2**.589, & H_2SO_4. — Salts change to salts of 1-naphthylamine-2-sulphonic ac. when heated abt. 200°.
2290	276 (753)	1.216 (15)	**Ethanesulphonmethylamide, EtSO_2.NHMe.** — ⟨**⟩ — Misc. aq.

CHAPTER XI

ORDER LXX (70)

COMPOUNDS CONTAINING CHLORINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

Order 70 contains a *Division A* for solids and a *Division B* for liquids. Neither " division " is subdivided into " sections."

With the exception of a few yellow compounds the tabulated species are colorless.

The sulphonyl chlorides derived from the sulphonic acids of Order VII, and their chlorine substitution products, constitute the most numerously represented chemical type in this order. Hence, Test **4.11** (on the characterization of sulphonyl halides) should always be consulted for suggestions in regard to experimental procedure. It should be noted in this connection that many sulphonyl chlorides of this order which, while recognized to be such from their origin and behavior are not entered in these tables, may nevertheless be readily identified by conversion into the corresponding amides, that form a group whose members have been even more generally studied and described than their related chlorides or acids.

ANALYTICAL TABLES

OF

ORDER LXX (70)

COMPOUNDS CONTAINING CHLORINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

DIVISION A, SOLID SPECIES.

No.	Melting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
	13–14	**"Mustard Gas."** — Cf. No. **70**.580; b.p. 246–7° d.
50	14.5	**Benzenesulphonyl Chloride, $PhSO_2Cl$.** — Cf. Division B, b.p. 251°.
55	24	**4-Chlortoluene-2-sulphonyl Chloride, $Cl.C_6H_3Me.SO_2Cl$.** — Plates. — E.s. eth., pet.-eth., bz. — Corresp. amide: m.p. 142°; ndl. fr. dil. alc.
60	24–6	**1,4-Dimethylbenzene-2-sulphonyl Chloride, $Me_2.C_6H_3.SO_2Cl$.** — Flat pr. — Corresp. amide: ndl.; d.s. h. aq.; m.p. 147–8°.
65	36	**Tetrachlorthiophene, C_4Cl_4S.** — Long lust. cryst. fr. dil. alc.
70	37	**2-Chlortoluene-4-sulphonyl Chloride, $Cl.C_6H_3Me.SO_2Cl$.** — E.s. pr. fr. pet.-eth. — Corresp. amide: m.p. 134°.
75	47	**Chloracetothienone, $ClCH_2.CO.C_4H_3S$.** — B.p. 259° c. — Strongly lachrymatory. — Oxidn. gives α-thiophenic ac., No. **7**.835.
80	51–2	**1,2-Dimethylbenzene-4-sulphonyl Chloride, $Me_2.C_6H_3.SO_2Cl$.** — Pr. fr. eth. Corresp. amide: cryst. fr. alc.; m.p. 144°.
85	53	**p-Chlorbenzenesulphonyl Chloride, $Cl.C_6H_4.SO_2Cl$.** — B.p. 141° (15 mm.). — Corresp. amide: m.p. 143–4°.
90	53–4	**Chlorthiophenol, $Cl.C_6H_4.SH$.** — 4-sided tbl. fr. alc. — E.s. bz., eth., h. alc. — $Pb\bar{A}_2$: lemon-yel. ppt.; i. h. aq., alc.
95	52; 56	**Toluene-2,4-disulphonyl Chloride, $Me.C_6H_3.(SO_2Cl)_2$.** — Pr. fr. eth. — Corresp. ac.: thick liq. — Corresp. amide: m.p. 185–6°.
100	56	**4-Chlortoluene-3-sulphonyl Chloride, $Cl.C_6H_3Me.SO_2Cl$.** — Tbl. — E.s. bz., eth. — Corresp. amide: ndl. fr. dil. alc.; m.p. 142°.
105	57	**1,3,5-Trimethylbenzenesulphonyl Chloride, $Me_3.C_6H_2.SO_2Cl$.** — Wedge shaped tbl. fr. eth. — Corresp. amide: ndl.; d.s. h. aq.; m.p. 141–2°.
107	57.4	**Perchlormethyl Trisulphide, $C_2Cl_6S_3$.** — Glassy pr. fr. alc. — V.s. eth., CS_2, warm alc. — Decd. by boiling under ordinary pressure. — (Not attacked by c. K_2CO_3).
110	61	**1,2,4-Trimethylbenzene-5-sulphonyl Chloride, $Me_3.C_6H_2.SO_2Cl$.** — Large monoclin. pr. fr. eth. — Corresp. amide: m.p. 181°.
115	60–65	**6-Chlortoluene-3-sulphonyl Chloride, $Cl,Me.C_6H_3.SO_2Cl$.** — Pearly pr. fr. lgr. — Corresp. amide: m.p. 128°.
120	63	**m-Benzenedisulphonyl Chloride, $C_6H_4.(SO_2Cl)_2$.** — B.p. 211° (20). — Monoclin. pr. — Corresp. amide: ndl.; m.p. 229°.
125	66; 68	**α-Naphthalenesulphonyl Chloride, $C_{10}H_7.SO_2Cl$.** — Lft. fr. eth. — E.s. alc., eth., bz.; alm. i. lgr. — Aq. at. slowly. — Corresp. ac.: e.s. aq.; m.p. 85–90°. — Corresp. amide: m.p. 150°.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — CHLORINE AND SULPHUR. — SOLIDS.
130	68	**p-Chlorbenzenesulphonic Ac.,** $Cl.C_6H_4.SO_3H$. — ⟨T. 4.3⟩ — Cryst. mass. — Corresp. chloride: m.p. 53°. — Corresp. amide: m.p. 143–4°.
135	69	**p-Toluenesulphonyl Chloride,** $Me.C_6H_4.SO_2Cl$. — B.p. 151.6° (20°). — Tbl. fr. eth. — Corresp. amide: m.p. 137°; v.d.s. c. aq. — Corresp. ac.: e.s. aq.; m.p. 92°.
140	69	**2-Chlornaphthalene-5-sulphonyl Chloride,** $Cl.C_{10}H_6.SO_2Cl$. — E.s. chlf., bz.; d.s. lgr. — Corresp. amide: lust. scales; m.p. 214°.
145	76	**β-Naphthalenesulphonyl Chloride,** $C_{10}H_7.SO_2Cl$. — B.p. 201° (13 mm.). — Lft. — Less sol. than α-comp. in eth., bz., chlf., CS_2. — Corresp. amide: m.p. 217° c.
150	80	**1-Chlornaphthalene-2-sulphonyl Chloride,** $Cl.C_{10}H_6.SO_2Cl$. — Lust. ndl. fr. bz. — V.s. eth., bz. — Corresp. amide: cryst. powd.; v.d.s. alc.; not melted @ 250°.
155	82	**Pentamethylbenzenesulphonyl Chloride,** $Me_5.C_6.SO_2Cl$. — Cryst. fr. eth. — E.s. alc., eth. — Corresp. amide: cryst.; r.d.s. c. alc.; s. alk.; m.p. 186°.
160	85	**2-Chlortoluene-3,5-disulphonyl Chloride,** $Cl.C_6H_2Me.(SO_2Cl)_2$. — Ndl. — E.s. bz., eth.; d.s. pet.-eth.
162	85.5	**4-Chlortoluene-1¹-sulphonyl Chloride,** $Cl.C_6H_3.CH_2.SO_2Cl$.
165	86.5–7	**3,5-Disulphobenzoyl Trichloride,** $C_6H_3.(COCl)(SO_2Cl)_2$. — Thick pr. w. $1C_6H_6$ fr. bz. — E.s. h. bz.; i. lgr. — W. aq. gives dichloride.
170	86.5	**Toluene-2,6-disulphonyl Chloride,** $Me.C_6H_3.(SO_2Cl)_2$. — Pr. fr. lgr. — E.s. eth.; less s. lgr. — Corresp. amide: ndl.; d.s. aq.; melts a. 260°.
175	86.5	**2-Chlornaphthalene-7-sulphonyl Chloride,** $Cl.C_{10}H_6.SO_2Cl$. — Cryst. —E.s. chlf., bz. — Corresp. amide: m.p. 176°.
180	88	**2-Chlortoluene-4,6-disulphonyl Chloride,** $Cl.C_6H_2Me.(SO_2Cl)_2$. — Octahedra. — E.s. bz., eth.; d.s. pet.-eth.
185	88	**3,4,5-Trichlortoluenesulphonyl Chloride,** $Cl_3.C_6H.Me,SO_2Cl$. — Ndl. fr. lgr.
190	91.5	**Chlorsulphobenzid,** $Cl.C_6H_4.SO_2.Ph$. — B.p. 389° (718 mm.). — Lft. — D.s. c. alc.
195	92	**Benzylsulphonyl Chloride,** $Ph.CH_2.SO_2Cl$. — Pr. — E.s. eth., h.bz. — Heat dec. to SO_2 & benzyl chloride. — Corresp. amide: mod. s. aq., alc.; m.p. 102°, 105°.
200	93–4; 88–90	**p-Chlorbenzenesulphinic Ac.,** $Cl.C_6H_4.SO_2H$. — Cryst. — D.s. c. aq., e.s. h. — Permanent in air but oxid. to p-chlorbenzenesulphonic ac. by CrO_3 mixt. — $Ba\bar{A}_2$: d.s. c. aq.
205	95	**1-Chlornaphthalene-4-sulphonyl Chloride,** $Cl.C_{10}H_6.SO_2Cl$. — Triclin. pr. fr. bz. — (PCl_5 gives 1,4-dichlornaphthalene). — Corresp. amide: ndl.; m.p. 187°.
210	95	**1-Chlornaphthalene-5-sulphonyl Chloride,** $Cl.C_{10}H_6.SO_2Cl$. — Cryst. fr. chlf. — Corresp. amide: silvery scales fr. alc.; m.p. 226°.
212	95	**Toluene-3,5-disulphonyl Chloride,** $Me.C_6H_3.(SO_2Cl)_2$. — Pr. fr. bz. + pet.-eth. — Amide: m.p. 214°, 210°.
213	96; 98	**(β)-Toluene-2,5-disulphonyl Chloride,** $Me.C_6H_3.(SO_2Cl)_2$. — Lust. rhomb. tbl. — D.s. eth.; e.s. CS_2, bz. — Amide: d.s. aq.; m.p. 224°.
215	96–7	**Benzophenone-o-sulphonyl Chloride,** $Ph.CO.C_6H_4.SO_2Cl$. — Cryst. fr. eth. — E.s. eth.; d.s. lgr. — W. aniline gives anilide: cryst. fr. alc.; m.p. 143–5°. — (Free acid not described.)
220	99	**1,2,4,5-Tetramethylbenzenesulphonyl Chloride,** $Me_4.C_6H.SO_2Cl$. — Glassy pr. fr. eth. — R.d.s. c. alc.; e.s. eth. — Corresp. amide: pr. fr. alc.; alm. i. c. aq.; m.p. 155°.
225	101	**1-Chlornaphthalene-8-sulphonyl Chloride,** $Cl.C_{10}H_6.SO_2Cl$. — Scales. — V.s. alc., bz. — Corresp. amide: lust. pr.; d.s. alc.; m.p. 196–7°.
230	106	**1-Chlornaphthalene-3-sulphonyl Chloride,** $Cl.C_{10}H_6.SO_2Cl$. — Cryst. — Corresp. amide: m.p. 168°, v.d.s. aq.
235	106	**1,2-Dichlornaphthalene-5-sulphonyl Chloride,** $Cl_2.C_{10}H_5.SO_2Cl$. — Pr. — E.s. eth., bz. — Corresp. amide: ndl. fr. dil. alc.; m.p. 223°.

No.	Melting-point (C.°)	“ADDITIONAL ELEMENTS” — CHLORINE AND SULPHUR. — SOLIDS.
240	108	**4-Chlortoluene-2,6-disulphonyl Chloride, $Cl.C_6H_2Me.(SO_2Cl)_2$.** — Pr. fr. bz. + pet.-eth. — E.s. bz.; less s. pet.-eth.
245	110	**1-Chlornaphthalene-3,8-disulphonyl Chloride, $Cl.C_{10}H_5(SO_2Cl)_2$.**
250	110.5	**2-Chlornaphthalene-6-sulphonyl Chloride, $Cl.C_{10}H_6.SO_2Cl$.** — Pr. fr. bz. — Amide: m.p. 183–4°.
255	111	**Toluene-3,4-disulphonyl Chloride, $Me.C_6H_3.(SO_2Cl)_2$.** — Scales. — E.s. chlf.; less s. eth. — Amide: m.p. 235–9° (sl.d.); e.s. aq., alc.
260	114	**1-Chlornaphthalene-3,6-disulphonyl Chloride, $Cl.C_{10}H_5.(SO_2Cl)_2$.** — Pr. — (Dimorphous; other form, ndl.; m.p. 127°.).
265	115	**Biphenylsulphonyl Chloride, $C_{10}H_9SO_2Cl$.** — Yellowish pr. fr. gl. ac. ac. — S. alc., eth., CS_2. — Corresp. amide, (fr. alc.-NH_3 @ 100°): ndl.; m.p. 227–30°; e.s. eth., CS_2; alm. i. bz.
270	114–5, 116	**Trichlormethyl Chlorthioformate, $Cl.CS_2.CCl_3$.** — Odor biting. — Colorless cryst. — I. aq.; d.s. alc.; e.s. eth.; v.s. CS_2. — Vol. w. st. — Permanent in air. — Conc. aq. ammon. gives NH_4SCN & NH_4Cl. — Boiled w. alc. gives H_2S, CO_2 & COS.
275	116	**1,8-Dichlornaphthalene-4-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — E.s. CS_2, bz. — Corresp. amide: tbl.; m.p. 229°.
280	118	**2-Chlornaphthalene-7-sulphonic Ac., $Cl.C_{10}H_6.SO_3H$.** — ⟨T. **4.3**⟩ — Cryst. w. $4H_2O$ in 6-sided tbl.; m.p. 68°. — Chloride: m.p. 86.5°. — Amide: m.p. 176°.
285	118	**4-Chlortoluene-3,5-disulphonyl Chloride, $Cl\ C_6H_2Me.(SO_2Cl)_2$.** — Tetrag. tbl. fr. ethyl acet. — E.s. eth., ethyl acetate; d.s. pet.-eth.
290	122	**(β)-2-Anthracenesulphonyl Chloride, $C_{14}H_9SO_2Cl$.** — Odorless canary-yellow cryst. fr. toluene. — D.s. alc., eth., lgr. — Resists short boiling w. aq. without decn. — Gives the reddish acid (wh. is s. in boiling aq. when heated w. aq. @ 140°) for wh. no m.p. is given. — Corresp. amide, (made by 4 hr. heating w. alc.-NH_3 @ 150°): m.p. 261°; i. alc., eth., bz., but s. in nitrobenzene.
295	122.5	**Naphthalene-1,7-disulphonyl Chloride, $C_{10}H_6.(SO_2Cl)_2$.**
300	124	**1,2-Dichlornaphthalene-7-sulphonyl Chloride, $Cl_2C_{10}H_5.SO_2Cl$.** — Ndl. — E. s. chlf., bz. — Corresp. amide: d.s. alc.; m.p. 227°.
305	124	**1,5-Dichlornaphthalene-2-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — Ndl. — Corresp. amide: tbl.; v.d.s. h. alc.; m.p. 282°.
310	127	**1-Chlornaphthalene-3,6-disulphonyl Chloride, $Cl.C_{10}H_5.(SO_2Cl)_2$.** — Ndl. — (Dimorphous, other forms melting @ 114°.)
315	127–8d.	**Chloral Sulphydrate, $2CCl_3.CHO.H_2S$.** — Cryst. scales of mercaptan-like odor! — I. aq.; e.s. alc.; less s. chlf.
320	129	**1,3-Dimethylbenzene-2,4-disulphonyl Chloride, $Me_2.C_6H_2.(SO_2Cl)_2$.** — Ndl. fr. eth. — Corresp. amide: silky ndl. fr. aq.; m.p. 249°.
325	129	**2-Chlornaphthalene-8-sulphonyl Chloride, $Cl.C_{10}H_6.SO_2Cl$.** — Ndl. — Corresp. amide: ndl. fr. dil. alc.; m.p. 235°.
330	130	**Trichlormethanesulphonic Ac., $Cl_3C.SO_3H + H_2O$.** — ⟨T. **4.3**⟩ — Sm. v. deliq. pr. — Strong v. stable acid, not at. by h. conc. HNO_3, CrO_3, or aqua regia. — $K\dot{A}.H_2O$: thin tbl.; s. aq., decg. above 300° to KCl, $COCl_2$ & SO_2.
335	130–3d.	**1-Chlornaphthalene-4-sulphonic Ac., $Cl.C_{10}H_6.SO_3H$.** — ⟨T. **4.3**⟩ — Lust. scales. — At 150° changes to 1,5-acid. — $Ba\dot{A}_2.2H_2O$: 6 sided tbl.; v.d.s. aq. — Chloride: pr. fr. bz.; m.p. 95°. — Amide: ndl.; m.p. 187°.
340	131	**1,3-Dimethylbenzene-4,6-disulphonyl Chloride, $Me_2.C_6H_2.(SO_2Cl)_2$.**
345	133	**1,4-Dichlornaphthalene-6-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — Ndl. fr. bz. — E.s. bz. — Amide: m.p. 245° d.; e.s. alc.
350	135	**Trichlormethanesulphonyl Chloride, $CCl_3.SO_2Cl$.** — B.p. 170°. — Camphor-like cryst. fr. dry bz. — Sbl. — Odor penetrating, characteristic, powerfully lachrymatory. — I. aq.; s. alc., eth., CS_2. — Decd. slowly by aq., quicker by alk. — Boiled w. alc. dec. to CCl_4 & SO_2. — At 200° gives

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — CHLORINE AND SULPHUR. — SOLIDS.
		$COCl_2$ & $SOCl_2$. — Corresp. acid: v. deliq.; m.p. 130°. — (Fr. moist Cl & CS_2.)
355	137	**Naphthalene-1,3-disulphonyl Chloride, $C_{10}H_6.(SO_2Cl)_2$.**
360	138	**1,2-Dichlornaphthalene-8-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — Ndl. fr. bz. — Corresp. amide: d.s. scales; m.p. 221°.
365	144	**4-Chlortoluene-2,5-disulphonyl Chloride, $Cl.C_6H_2Me.(SO_2Cl)_2$.** — Pr. fr. bz. — D.s. bz.; alm. i. eth., pet.-eth.
370	145	**1,3-Dichlornaphthalene-5-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — Cryst. fr. gl. ac. ac. — E.s. bz. — Amide: m.p. 250° d, 272°; d.s. aq.
375	146	**Naphthalene-1,3,5-trisulphonyl Chloride, $C_{10}H_5.(SO_2Cl)_3$.**
380	147; 140–1	**p-Dichlorsulphobenzid,** $(C_6H_3Cl)_2.SO_2$. — Lft. — Sbl. — Cryst. fr. bz. + lgr. — D.s. c. alc.
385	151	**1,6-Dichlornaphthalene-4-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — Ndl. fr. gl. ac. ac. — Corresp. amide: flat ndl.; d.s. c. aq.; m.p. 217°.
390	153	**Toluene-2,4,6-trisulphonyl Chloride, $Me.C_6H_2.(SO_2Cl)_3$.** — Tbl. fr. chlf. — V.d.s. h. eth. — Corresp. amide: cryst.; alm. i. aq.; m.p. a. 300°.
400	155	**6-Chlor-1,3-dimethylbenzene-2,4-disulphonyl Chloride, $Cl.C_6HMe_2.(SO_2Cl)_2$.** — Ndl. fr. eth. — Corresp. amide: silky ndl. fr. aq.; m.p. 270°.
405	156–7	**Naphthalene-1,4,8-trisulphonyl Chloride, $C_{10}H_5(SO_2Cl)_3$.** — Ndl.
410	158	**1,8-Dichlornaphthalene-3-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — Scales fr. bz. — Corresp. amide: ndl. fr. alc.; m.p. 197°.
415	157–8; 162	**Naphthalene-2,7-disulphonyl Chloride, $C_{10}H_6.(SO_2Cl)_2$.** — 4 or 6-sided plates fr. bz. — S. in 7.5 pt. bz. @ 14°; mod. s. eth. — Corresp. amide: ndl.; mod. s. h. aq.; m.p. 242–3°.
420	158	**2-Chlortoluene-4,5-disulphonyl Chloride, $Cl.C_6H_2Me.(SO_2Cl)_2$.** — Pr. — D.s. bz.; alm. i. eth., pet.-eth.
425	160	**Naphthalene-1,4-disulphonyl Chloride, $C_{10}H_6.(SO_2Cl)_2$.** — Monoclin. tbl. fr. bz. — Amide: ndl. fr. dil. alc.; m.p. 273°.
430	163.5	**2,7-Dichlornaphthalene-3-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — Corresp. amide: m.p. 218°.
43	167	**1,2-Dichlornaphthalene-6-sulphonyl Chloride, $Cl_2.C_{10}H_5.SO_2Cl$.** — D.s. ndl. — Corresp. amide: m.p. 192°.
440	173–4	**o-Dichlorsulphobenzid,** $(Cl_2C_6H_3).SO_2$. — B.p. a. 360° sl.d. — Cryst. — Alm. i. alc.
445	174–5	**Chlor-1,8-naphthosulton, $C_{10}H_5ClSO_3$.** — Long yel. ndl. fr. alc. — (Fr. PCl_5 & 1,8-diazonaphthalenesulphonic ac.)
450	175	**Retenedisulphonyl Chloride,** $C_{18}H_{16}.(SO_2Cl)_2$. — Sm. pr. cryst. in stellate groups fr. gl. ac. ac. — E.s. bz.; v.d.s. eth. — (Aq. first dec. to retenedisulphonic ac. & HCl in tube @ 160°.)
455	183	**Naphthalene-1,5-disulphonyl Chloride, $C_{10}H_6.(SO_2Cl)_2$.** — Pr. fr. bz. — (PCl_5 gives 1,5-dichlornaphthalene.)
460	184	**1,3,5-Benzenetrisulphonyl Chloride, $C_6H_3.(SO_2Cl)_3$.** — V.d.s. alc., lgr.; e.s. bz., chlf. — Boiling w. alc. gives the free ac., (deliq. solid). — Amide: m.p. 310–15°.
465	191	**Naphthalene-1,3,6-trisulphonyl Chloride, $C_{10}H_5.(SO_2Cl)_3$.**
470	193	**Anthraquinone-2-sulphonyl Chloride, $C_{14}H_7O_2.SO_2Cl$.** — Pale yel. lft. —Mod. s. bz., toluene, gl. ac. ac.; alm. i. alc., eth. — Not at. by c. aq., but easily at 160°. — Na salt of corresp. ac., $C_{14}H_7O_2.SO_3Na + H_2O$ ("Silver salt"): silvery lft.; d.s. aq. — $C_{14}H_7O_2.SO_3Me$: lft.; m.p. 123°. — W. alc.-NH_3 @ 140° some hrs. gives amide: yel. ndl. fr. gl. ac. ac.; m.p. 261°. — (No m.p. for corresp. important acid). — The sulphone, $C_{14}H_7O_2.SO_2.C_6H_4.NMe_2$: m.p. 171°. Cf. Ber. **13**, 693.
475	200	**Naphthalene-2,3,6-trisulphonyl Chloride, $C_{10}H_5.(SO_2Cl)_3$.** — Tbl. fr. bz.
480	203d.	**Diphenyl-4,4¹-disulphonyl Chloride, $(SO_2Cl.C_6H_4\text{-})_2$.** — Pr. fr. gl. ac. ac. —

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — CHLORINE AND SULPHUR. — SOLIDS.
		S. alc., eth., bz. — Corresp. ac.: deliq.; m.p. 72.5°. — Corresp. amide: m.p. a.300°.
482	210, 214	**Toluene-3,5-disulphonyl Chloride, $Me.C_6H_3(SO_2.NH_2)_2$.** — Pr. fr. aq. — D.s. c. aq.; more s. ammon., alc.
485	215	**Tetrachlorthiophene Tetrachloride, C_4Cl_8S.** — Odor sharp, penetrating! — Thick plates fr. chlf. — V.s. eth., chlf., bz., CS_2.
490	226	**Naphthalene-2,6-disulphonyl Chloride,** $C_{10}H_6.(SO_2Cl)_2$. — Ndl. — Not volat. — S. in 221 pt. bz. @ 14°; alm. i. eth. — Corresp. amide: ndl. fr. h. fusel oil; v.d.s. h. aq.; alm. i. alc., eth , bz.; not melted @ 305°. — Corresp. acid: deliq.

ANALYTICAL TABLES

OF

ORDER LXX

COMPOUNDS CONTAINING CHLORINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

DIVISION B, LIQUID SPECIES.

No.	Boiling-point (C.°)	Specific Gravity	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
540	73.5	1.509 (15)	**Thiophosgene, $CSCl_2$.** — Red liq. of suffocating odor! — Fumes in air. — When impure gives polymer., m.p. 116°, in sunlight. — Boiled for some hours w. aq. is completely decd. to H_2S & CO_2. — Aq.-KOH gives carbonate, chloride & sulphide. — Gives mustard oils w. all primary amines. ($CSCl_2 + NH_2R = CS.NR + 2HCl$).
550	130		**(α?)-Chlorthiophene, C_4H_3ClS.** — "Indif." liq. — Gives indophenine react. (Cf. No. **7**.1395).
555	146.5–8c; 149d.	1.722	**Perchlormethylmercaptan, $CCl_3.SCl$.** — Odor disagreeable! — Light yel. — Decd. e. by alk. to CO_2, S & HCl.
560	151–4c. sl.d.	1.263 (18)	**Ethyl Chlorosulphonate, $Cl.SO_2.OEt$.** — Odor irritating, producing flow of tears! — S. eth., chlf., lgr. — Decd. slowly by c. & rapidly by h. aq. — Decd. @ 160° to SO_2, H_2SO_4, HCl & C_2H_4.
565	157c.		**β-Chlordiethyl Sulphide, $CH_2Cl.CH_2.S.Et$.** — Oil of not unpleasant odor. — Less toxic than mustard gas.
567	160	1.51	**Methanesulphonyl Chloride, $MeSO_2Cl$.** — (No m.p. for amide known. Corresp. acid a. syrup.)
570	170		**Dichlorthiophene, $C_4H_2Cl_2S$.** — Gives indophenine react. (Cf. No. **7**.1395.)
575	206–7		**Trichlorthiophene, C_4HCl_3S.**
580	217 sl.d.		**β,β^1-Dichlordiethyl Sulphide, "Mustard Gas", $(CH_2Cl.CH_2)_2S$.** — Odor faint like decaying horse radish. — V. toxic in vapor & as skin irritant. — Vol. w. st. — Boiled w. K_2S sol. gives $(C_2H_4S)_x$: white amorph. powd.; i. alc., eth., CS_2. — @ 0° solidif. to long pr.; m.p. 13–14°; alm. i. aq.; e.s. alc., eth., chlf., lgr., ac. ac., C_6H_5Cl.
585	246-7d.; 251.5 (th.i.)	1.3842 (15/15); 1.274 (20°)	**Benzenesulphonyl Chloride, $C_6H_5.SO_2Cl$.** — Rhomb. cryst. — M.p. 14.5° — Not decd. by c. aq. — E.s. alc. — Conc. ammon. at. vigorously giving corresp. amide: m.p. 150°, No. **54**.1145.

CHAPTER XII

ORDER CLVIII (158)

COMPOUNDS CONTAINING NITROGEN, CHLORINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

Order 158 contains a *Division A* for solids and a *Division B* for liquids. Neither of these " divisions " is subdivided into " sections."

With the exception of a few azo compounds, the order includes no deeply colored species. The odors of the liquid species in Division B are usually unpleasant and irritating.

A majority of the tabulated species of the order are aromatic chlorsulphonyl, nitrosulphonyl, or chlornitrosulphonyl chlorides, or chlorsulphonamides. Hence, Tests **4**.11 (on sulphonyl chlorides) and **4**.12 (on sulphonamides) should be always consulted for suggestions in regard to experimental procedure.

ANALYTICAL TABLES

OF

ORDER CLVIII (158)

COMPOUNDS CONTAINING NITROGEN, CHLORINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

DIVISION A, SOLID SPECIES.

No.	Melting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	40–41	**2-Chlor-1-nitrobenzene-5-sulphonyl Chloride, $Cl(NO_2).C_6H_3.SO_2Cl$.** — Amide: cryst. fr. alc.; m.p. 175–6°.
55	43–4.5	**4-Nitrotoluene-2-sulphonyl Chloride, $NO_2.C_6H_3Me.SO_2Cl$.** — Rhomb. tbl. fr. eth. — Corresp. ac.: m.p. 130°; s. aq.
60	59–60	**2-Nitroaniline-4-sulphonyl Chloride, $NO_2.C_6H_3.NH_2,SO_2Cl$.** — Tbl. fr. eth. — Corresp. acid: v.s. aq.
65	60.5	**m-Nitrobenzenesulphonyl Chloride, $NO_2.C_6H_4.SO_2Cl$.** — 4-sided pr. — Amide: m.p. 161°.
70	60–1	**6-Nitro-1,4-dimethylbenzene-2-sulphonyl Chloride, $NO_2.C_6H_2Me_2.SO_2Cl$.** — Rhomb. pr. — E.s. eth., chlf., bz., CS_2; less s. pet.-eth. — Corresp. ac. hygroscopic. — Amide: s. alc.; i. aq.; m.p. 172–3°.
75	67	**o-Nitrobenzenesulphonyl Chloride, $NO_2.C_6H_4.SO_2Cl$.** — Colorless pr. — E.s. eth.; d.s. lgr. — Amide: d.s. c. aq.; m.p. 186°.
80	74.5–5.5	**5-Nitro-1,4-dimethylbenzene-2-sulphonyl Chloride, $NO_2.C_6H_2Me_2.SO_2Cl$.** — Plates fr. eth. + pet.-eth. — S. eth., chlf., bz. — Amide: plates fr. 50% alc.; m.p. 197–8°.
85	82	**p-Azobenzenesulphonyl Chloride, $Ph.N_2.C_6H_4.SO_2Cl$.** — *Or.-yel.* monoclin. ndl. fr. eth. — I. c. aq. & v. slowly decd. by boiling aq. — Corresp. ac.; m.p. 127°.
90	89–90	**4-Chlornitrobenzene-3-sulphonyl Chloride, $Cl(NO_2).C_6H_3.SO_2Cl$.** — Cryst. fr. eth. — Amide: ndl.; m.p. 185–6°.
105	96	**Nitrobenzene-3,5-disulphonyl Chloride, $NO_2.C_6H_3.(SO_2Cl)_2$.** — W. NH_3 gives amide: m.p. 242°. — Corresp. ac. deliq.
110	96	**2-Nitro-1,3-dimethylbenzene-4-sulphonyl Chloride, $NO_2.C_6H_2Me_2.SO_2Cl$.** — Cryst. — Corresp. amide: ndl.; e.s. alc., eth.; m.p. 172°.
115	97	**5-Nitro-1,3-dimethylbenzene-4-sulphonyl Chloride, $NO_2.C_6H_2Me_2.SO_2Cl$.** — Lft. — E.s. alc., eth., chlf., bz. — Corresp. amide: ndl. fr. dil. alc.; m.p. 108°; v.s. alc., eth.
120	99	**1-Nitronaphthalene-4-sulphonyl Chloride, $NO_2.C_{10}H_6.SO_2Cl$.** — Pr. fr. chlf. — Amide: scales; m.p. 188°.
125	100	**m-Nitrobenzylsulphonyl Chloride, $NO_2.C_6H_4.CH_2.SO_2Cl$.** — Cryst. — Amide: m.p. abt. 159° d.
130	102	**1,3-Dinitro-4-sulphonyl Chloride, $(NO_2)_2.C_6H_3.SO_2Cl$.** — Cryst. fr. eth. — Corresp. amide: silky ndl. ; m.p. 154°.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN, CHLORINE AND SULPHUR. — SOLIDS.
135	109.5–10.5	**3-Nitro-1,4-dimethylbenzene-2-sulphonyl Chloride,** $NO_2.C_6H_2Me_2.SO_2Cl$. — Pr. fr. eth. + pet.-eth. — S. eth., chlf., bz. — Corresp. amide: ndl. fr. 50% alc.; m p. 191–2°.
140	113	**1-Nitronaphthalene-5-sulphonyl Chloride,** $NO_2.C_{10}H_6.SO_2Cl$. — Yellowish ndl. fr. eth. — D.s. eth.; e.s. chlf., bz.; i. lgr. — Amide: pr.; d.s. c. alc.; m.p. 225°, 229°.
145	117–8	**2,6-Dinitro-1,3-dimethyl-4-sulphonyl Chloride,** $(NO_2)_2.C_6HMe_2.SO_2Cl$. — Cryst. — E.s. eth., chlf. — Corresp. amide: ndl. fr. dil. alc.; m.p. 158°.
150	121–2	**m-Dichlordiphenylthiourea,** $(Cl.C_6H_4.NH)_2.CS$.
155	123–5	**2,6(?)-Dinitrotoluene-4-sulphonyl Chloride,** $(NO_2)_2.C_6H_2Me.SO_2Cl$. — Cryst. — Corresp. amide: cryst.; m.p. 203°.
160	125.5	**1-Nitronaphthalene-6-sulphonyl Chloride,** $NO_2.C_{10}H_6.SO_2Cl$. — Pr. fr. bz. — Amide: m.p. 180°, 184°; s. boiling alc.
165	138	**3,3¹-Azoxybenzenedisulphonyl Chloride,** $(ClSO_2.C_6H_4)_2.N_2O$. — Yel.-red oblique rhomb. cryst. fr. toluene. — E.s. bz., eth. — Corresp. amide: m.p. 273°.
170	139.5–40	**1-Nitronaphthalene-3-sulphonyl Chloride,** $NO_2.C_{10}H_6.SO_2Cl$. — Yellowish ndl. — V.d.s. gl. ac. ac. — Amide: ndl.; m.p. 225°.
175	140–1	**1-Nitronaphthalene-3,6-disulphonyl Chloride,** $NO_2.C_{10}H_5.(SO_2Cl)_2$. — Yel. ndl. fr. gl. ac. ac. — Amide: m.p. 286–7° d.; v.d.s. h. aq.
180	142	**4-Chlortoluene-2-sulphonamide,** $Cl.C_6H_3Me.SO_2NH_2$. — Ndl. fr. dil. alc.
185	143–4	**p-Chlorbenzenesulphonamide,** $Cl.C_6H_4.SO_2NH_2$. — Lft.
190	145	**1,8-Dinitronaphthalene-3-sulphonyl Chloride,** $(NO_2)_2.C_{10}H_5.SO_2Cl$. — Tbl. fr. chlf. — Amide: dec. fr. 272°.
195	145–6	**o-Dichlordiphenylthiourea,** $(Cl.C_6H_4.NH)_2.CS$.
200	148	**m-Chlorbenzenesulphonamide,** $Cl.C_6H_4.SO_2NH_2$. — Tbl. — E.s. alc., eth., h. aq.
205	150–60d.	**Phenylmustard-oil Chloride,** $(C_7H_5NSCl)_2$. — Cryst. — V. unstable. — Decd. by aq. or alc. — S. in warm alc. giving the oxide, $(C_7H_5NS)_2O$: yel. ndl. fr. alc.; m.p. 118°. — (Fr. Cl & phenylmustard-oil in chlf. sol.)
207	153–4	**p-Chlorphenylmercapturic Ac.,** $Me.CO.NH.C(S.C_6H_4Cl),Me.CO_2H$. — Lft. fr. aq. or alc. — D.s. aq.; e.s. alc.; i. eth. — Boiled w. conc. HCl gives chlorphenylcysteïn: m.p. 182–4°.
210	158–9	**5-Chlor-1-nitrobenzene-2-sulphonamide,** $Cl(NO_2).C_6H_3.SO_2NH_2$. — 4-sided lft. fr. alc. — D.s. aq.; mod. s. alc.
215	161d.	**1-Nitronaphthalene-8-sulphonyl Chloride,** $NO_2.C_{10}H_6.SO_2Cl$. — Pr. fr. 9 pt. chlf. — D.s. eth., CS_2, lgr.
220	164–5	**1-Chlor-3-nitrobenzene-5-sulphonamide,** $Cl(NO_2).C_6H_3.SO_2NH_2$.
225	166	**p-Dichlordiphenylthiourea,** $(Cl.C_6H_4.NH)_2.CS$. — 1000 pt. c. CS_2 dis. 0.264 pt.; 1000 pt. c. 91.4% alc. dis. 6.29 pt. — (Fr. p-chloraniline & CS_2 in boiling alc.).
230	167	**1-Nitronaphthalene-7-sulphonyl Chloride,** $NO_2.C_{10}H_6.SO_2Cl$. — Large pr. — D.s. CS_2. — Amide: yel. pr. fr. alc.; m.p. 223°.
235	175–6	**2-Chlor-1-nitrobenzene-5-sulphonamide,** $Cl(NO_2).C_6H_3.SO_2NH_2$. — Pr. fr. alc.
240	176	**2-Chlornaphthalene-7-sulphonamide,** $Cl.C_{10}H_6.SO_2NH_2$. — Mic. pr. — E.s. alc.
245	180	**3-Chlor-1-nitrobenzene-2-sulphonyl Chloride,** $Cl,(NO_2).C_6H_3.SO_2Cl$. — Pr. fr. eth. — Amide: cryst.; carbonizes without melting.
247	180; 184	**1-Nitronaphthalene-6-sulphonyl Chloride,** $NO_2.C_{10}H_6.SO_2NH_2$. — Yellowish cryst. powd. — V.d.s. h. aq.; s.h. alc.
250	183–4	**2-Chlornaphthalene-6-sulphonamide,** $Cl.C_{10}H_6.SO_2.NH_2$. — Ndl.
255	185–6; 181	**1-Chlornaphthalene-7-sulphonamide,** $Cl.C_{10}H_6.SO_2.NH_2$. — Ndl.

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN, CHLORINE AND SULPHUR. — SOLIDS.
260	187	**1-Chlornaphthalene-4-sulphonamide**, $Cl.C_{10}H_6.SO_2NH_2$. — Ndl.
265	190–2	**1-Nitronaphthalene-3,7-disulphonyl Chloride**, $NO_2.C_{10}H_5(SO_2Cl)_2$. — Pr. fr. bz. — S. bz., h. lgr.; d.s. eth. — Amide: ndl. fr. aq.; m.p. a. 300°, d.s. aq.; v.d.s. alc.
270	192	**1,2-Dichlornaphthalene-6-sulphonamide**, $Cl_2.C_{10}H_5.SO_2NH_2$. — V.d.s. ndl.
275	194	**α-1-Nitroanthraquinone-2-sulphonyl Chloride**, $NO_2.C_{14}H_6O_2.SO_2Cl$. — Yellowish ndl. — Alm. i. alc., eth.; e.s. h. toluene. — V. stable to c. aq. — M.p. of corresp. ac. 255° d.; d.s. c. aq.
280	195	**6-Chlor-1,3-dimethylbenzene-4-sulphonyl Chloride**, $Cl.C_6H_2Me_2.SO_2Cl$. — Glassy pr. fr. alc.
285	196–7	**1-Chlornaphthalene-8-sulphonamide**, $Cl.C_{10}H_6.SO_2NH_2$. — Lust. pr. fr. alc. — D.s. alc.
290	199	**(v)-6-Chlor-1,2-dimethylbenzene-3-sulphonamide**, $Cl.C_6H_2Me_2.SO_2Cl$. — Silky ndl. fr. aq. — V.d.s. h. aq.; mod. s. h. alc.
295	207	**5-Chlor-1,2-dimethylbenzene-4-sulphonamide**, $Cl.C_6H_2Me_2.SO_2NH_2$. — Ndl. fr. alc. — V.d.s. h. aq.; d.s. c. alc.
300	216	**1-Chlornaphthalene-6-sulphonamide**, $Cl.C_{10}H_6.SO_2NH_2$. — Thin lft. fr. alc.
305	217	**1,6-Dichlornaphthalene-4-sulphonamide**, $Cl_2.C_{10}H_5.SO_2NH_2$. — Flat ndl. of adamantine lustre. — D.s. c. aq.
310	218.5–9.5	**1,8-Dinitronaphthalene-3,6-disulphonyl Chloride**, $(NO_2)_2.C_{10}H_4.(SO_2Cl)_2$. — Tbl. w. 1 mol. C_6H_6 fr. bz.; bz. lost in air. — Amide: browns 290–300°; m.p. abt. 306°; s. in 600 pt. h. aq.
315	221	**1,2-Dichlornaphthalene-8-sulphonamide**, $Cl_2.C_{10}H_5.SO_2NH_2$. — D.s. scales w. fatty lustre.
320	223	**1,2-Dichlornaphthalene-5-sulphonamide**, $Cl_2.C_{10}H_5.SO_2NH_2$. — Lust. ndl. fr. dil. alc.
325	226	**1-Chlornaphthalene-5-sulphonamide**, $Cl.C_{10}H_6.SO_2NH_2$. — Silvery scales fr. alc.
330	227	**1,2-Dichlornaphthalene-7-sulphonamide**, $Cl_2.C_{10}H_5.SO_2NH_2$. — Cryst. — D.s. alc.
335	235	**2-Chlornaphthalene-8-sulphonamide**, $Cl.C_{10}H_6.SO_2NH_2$. — Ndl. fr. dil. alc.
340	245	**1,4-Dichlornaphthalene-6-sulphonamide**, $Cl_2.C_{10}H_5.SO_2NH_2$. — Ndl. fr. alc. — Alm. i. aq.; e.s. alc.
345	270	**6-Chlor-1,3-dimethylbenzene-2,4-disulphonamide**, $Cl.C_6HMe_2.(SO_2NH_2)_2$. — Silky ndl. fr. aq.
350	272: 250d.	**1,3-Dichlornaphthalene-5-sulphonamide**, $Cl_2.C_{10}H_5.SO_2NH_2$. — Flat cryst. — V.d.s. aq.; e.s. alc. — Ba salt of corresp. ac.: fine ndl.; s. 1650 pt. c. aq.
355	282	**1,5-Dichlornaphthalene-2-sulphonamide**, $Cl_2.C_{10}H_5.SO_2NH_2$. — Tbl. — V.d. s. h. alc.

ANALYTICAL TABLES

OF

ORDER CLVIII

COMPOUNDS CONTAINING NITROGEN, CHLORINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

DIVISION B, LIQUID SPECIES.

No.	Boiling-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
400	182–4 sl.d.	**Dimethylsulphamyl Chloride, $Me_2N.SO_2Cl$.** — Vapors v. irritating. — I. aq., KOH, HCl; e.s. alc., eth., bz. — Boiled w. aq. gives HCl, H_2SO_4 & Me_2OH.
405	202–3	**Chloroethyl Thiocyanate, $CH_2Cl.CH_2.SCN$.** — Odor unpleasant. — Dec. @ 210°. — I. aq.
410	208	**Diethylsulphamyl Chloride, $Et_2N.SO_2Cl$.** — Yel. oil. — I. aq., e.s. alc., eth., bz.
415	209–10 (th.i.)	**Phenylisocyanide Chloride, $PhNCCl_2$.** — Odor penetrating, v. disagreeable! — Aniline at. violently giving α-triphenylguanidine, No. **2**.882.
420	248	**Chlorbenzothiazole, $\ulcorner C_6H_4.S.CCl : N \urcorner$.** — M.p. 24°. — Cryst. fr. freezing mixt. — E.s. alc.; pptd. by aq. — KOH fusion gives o-aminothiophenol, CO_2 & HCl.

CHAPTER XIII

ORDER CLXI (161)

COMPOUNDS CONTAINING NITROGEN, CHLORINE AND GOLD AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

The tabulated chloroaurates of Order 161 include all chloroaurates of known melting-point that have been mentioned in the descriptions of the bases of Orders II and L, together with a few others derived from bases of the same Orders not possessing recorded melting- or boiling-points. The chloroaurates require independent treatment because they are often obtained in the course of investigations of bases and basic mixtures (Cf. T. **2**.13, Vol. II) and are sometimes far easier to isolate in a state of purity than the bases from which they are derived. The history of the specimen under examination will usually indicate to the analyst that the compound is a chloroaurate, as it will nearly always be a preparation which he has himself made.

The chloroaurates are all colored. The colors range from light yellow to red. Although liquid chloroaurates are not unknown, the descriptions in the Tables are limited to the solid species forming Division A.

Tables and Procedure. — Characterizations in the tables of Order 161 always include a melting-point, a gold percentage, a reference to a description of a " corresponding base " in an earlier order, and sometimes a statement about the color and solubility of the chloraourate. The melting-points and gold percentages are those of preparations from which all water and alcohol of crystallization have been carefully removed by drying — unless the presence of these substances is shown in the accompanying formulas. The general procedure for identifying a chloroaurate includes the quantitative determination of gold and chlorine, and a molecular weight determination by the simple methods of T. **4**.16, and an attempt to isolate and identify the " corresponding base." (Cf. foot-note under " General Observations " of Chap. XIV.)

The atomic ratio of chlorine to gold in chloroaurates of bases of Order II is 4 : 1, such chloroaurates corresponding to the general formula $B^I.HAuCl_4$. If the atomic ratio of chlorine to gold is greater than 4 : 1, a chloroaurate must be a derivative of a species of Order L.

ANALYTICAL TABLES

OF

ORDER CLXI (161)

COMPOUNDS CONTAINING NITROGEN, CHLORINE AND GOLD AS "ADDITIONAL ELEMENTS"

(CHLOROAURATES)

DIVISION A, SOLID SPECIES.

No.	Melting-point (C.°)	% Au	CHLOROAURATES OF: — Characterizations.
50	62	41.0	**Pelletierine, $C_8H_{15}ON.HAuCl_4$.** — Corresp. base: No. **2**.1251; odor coniine-like; b.p. 195° d.
55	87	42.7	**2-Methyl-5-ethylpyridine, $C_8H_{11}N.HAuCl_4$.** — Yel. lft.; s. aq. Corresp. base: No. **2**.1225; b.p. 173–4°.
60	95–6	42.2	**3-Propylpiperidine, $C_8H_{17}N.HAuCl_4$.** — Lemon yel. ndl. fr. aq. browning @ 88°. — Corresp. base: No. **2**.1228; b.p. 174°.
65	100	33.7	**Pilocarpine, $C_{11}H_{16}O_2N_2.HAuCl_4.H_2O$.** — Lemon yel. ndl. — Corresp. base: No. **2**.544; m.p. 34°.
70	abt. 100	42.8	**2,3,4-Trimethylpyridine, $C_8H_{11}N.HAuCl_4$.** — Ndl. fr. h. aq.; v.d.s. c. aq. — Corresp. base: No. **2**.1241; b.p. 185–8°.
75	110–12	32.3	**Apoatropine, $C_{17}H_{21}O_2N.HAuCl_4$.** — Ndl. fr. h. aq. — Corresp. base: **2**.625, m.p. 60–2°.
80	112–3	42.8	**2,4,6-Trimethylpyridine, $C_8H_{11}N.HAuCl_4$.** — Wooly ndl. fr. h. aq. — Corresp. base: No. **2**.1223; b.p. 171–2°.
85	112–14	31.3	**Pseudoatropine, $C_{17}H_{23}O_3N.HAuCl_4$.** — Yel. ndl. fr. aq. — Corresp. base: No. **2**.817; m.p. 119–20°.
90	abt. 122	44.5	**Iminoethyl Alc., $C_4H_9O_2N.HAuCl_4$.** — Ndl. — Corresp. base: No. **2**.538; m.p. 28°.
95	123	42.4	**β-Coniceine, $C_8H_{15}N.HAuCl_4$.** — Ppts. oily, solidfg. to tbl. — Corresp. base: No. **2**.559; m.p. 40–1°.
100	130–1	44.8	**β-Pipecoline, $C_6H_{13}N.HAuCl_4$.** — Mod. s. aq. — Corresp. base: No. **2**.1144; b.p. 125–6°c.
105	133–4	40.8	**Pseudoconhydrine, $C_8H_{17}ON.HAuCl_4$.** — Cryst. (separating oily). — Corresp. base: No. **2**.766; m.p. 105–6°.
110	135–6u.c.	19.0	**Aconitine, $C_{34}H_{47}O_{11}N.HAuCl_4.3H_2O$.** — Mic. pr. fr. h. 50% alc. — Corresp. base: No. **2**.972[illegible] m.p. 188–9° u.c. (sl.d.).
115	135–6u.c.	31.4	**Atropine, $C_{17}H_{23}O_3N.HAuCl_4$.** — Cryst. fr. h. aq. — Corresp. base: No. **2**.797; m.p. 115° u.c.
120	145	40.8	**3-Methylquinoline, $C_{10}H_9N.HAuCl_4$.** — Ndl. — D.s. c. aq. — Corresp. base: No. **2**.1388; b.p. 252°.
125	149	44.1	**3,5-Dimethylpyridine, $C_7H_9N.HAuCl_4$.** — Yel. ndl. — D.s. aq. — Corresp. base: No. **2**.1221; b.p. 169–70°.
130	152	35.1	**Anhalonidine, $C_{12}H_{15}O_3N.HAuCl_3$.** — Unstable. — D.s. aq. — Corresp. base: No. **2**.913; m.p. 160°.

No.	Melting-point (C.°)	% Au	" ADDITIONAL ELEMENTS " — N, Cl & Au — SOLID CHLOROAURATES OF:
135	154–60	19.9	**β-Japaconitine, $C_{34}H_{49}O_{11}N.HAuCl_4$.** — Corresp. base: No. **2**.998; m.p. 204°.
140	160–2		**3,4-Dimethylpyridine, $Me_2.C_5H_3N.(HCl.2AuCl_3)$.** — Fine yel. ndl. — Corresp. base: No. **2**.1208; b.p. 164°c.
145	161.5°u.c.	31.3	**i-Hyoscyamine, $C_{17}H_{23}O_3N.HAuCl_4$.** — (Softens fr. 159°). — Y-lft. — Corresp. base: No. **2**.777; m.p. 107–8° u.c.
150	162–5d.	42.4	**1^1-Amino-1,3,4,5-tetramethylbenzene, $NH_2.CH_2.C_6H_2.Me_3.$-$HAuCl_4$.** — Garnet red pr. — Corresp. base: No. **2**.831; m.p. 123°.
155	163		**d,l-Laudanosine, $C_{21}H_{27}O_4N.HAuCl_4$(?).** — Fine red-yel. tbl. fr. dil. alc. — Corresp. base: **2**.799; m.p. 115°.
160	163–5d.	20.6	**Physostigmine, $C_{15}H_{21}O_2N_3.(HAuCl_4)_2$.** — Fine yel. lft. (at first oily ppt.). — Corresp. base: **2**.767; m.p. 105–6°.
165	167	30.5	**Cusparidine, $C_{19}H_{17}O_3N.HAuCl_4$.** — Corresp. base: No. **2**.687; m.p. 79°.
170	170	49.0	**3-Methylpyrrolidine, $C_4H_9N.HAuCl_4$.** — Mic. tbl. — E.s. aq. — Corresp. base: **2**.1109; b.p. 103–5°.
175	170–4	43.5	**Creatinine, $C_4H_7ON_3.HAuCl_4$.** (Dried @ 100°). — Golden lft. — E.s. aq., alc.; i. eth. — Corresp. base: No. **2**.1049; m.p. abt. 270° u.c. d.
180	169–70; 176	40.8	**Hydrotropine, $C_8H_{17}ON.HAuCl_4$.** — Cryst. → D.s. c. aq. — Corresp. base: No. **2**.1353; b.p. 233°c.
185	173d.	44.8	**1-Amino-1-methylcyclopentane, $C_6H_{13}N.HAuCl_4$.** — (Dried @ 110°). — Or. ndl. — Corresp. base: No. **2**.1134; b.p. 114°.
190	174–5	29.7	**Galipine, $C_{20}H_{21}O_3N.HAuCl_4$.** — Corresp. base: No. **2**.800; m.p. 115.5°.
195	177	39.6	**3,4-Dimethylquinoline, $C_{11}H_{11}N.HAuCl_4$.** — Cryst. fr. dil. HCl. — Corresp. base: No. **2**.645; m.p. 65°.
200	180	45.3	**2-Methylpyrazine, $C_5H_6N_2.HAuCl_4$.** — Yel. lft. fr. dil. HCl. — Decd. by aq. — Corresp. base: No. **2**.1162; b.p. 135°c.
205	181	39.6	**4,8-Dimethylquinoline, $C_{11}H_{11}N.HAuCl_4$.** — Ndl. fr. HCl. — Corresp. base: No. **2**.1426; b.p. 273–4° (th.i.).
210	182u.c. d.	21.2	**Cevadine, $C_{32}H_{49}O_9N.HAuCl_4$.** — (Dried @ 100°). — Ndl. fr. h. 50% alc. (Cryst. w. 2 Aq.). — Corresp. base: No. **2**.1000; m.p. 205°.
215	186–7	41.0	**Arecaine, $C_7H_{11}O_2N.HAuCl_4$.** — Pr. fr. h. dil. HCl. — Corresp. base: No. **2**.2506; m.p. 213°.
220	187	27.7	**β-Homochelidonine, $C_{21}H_{23}O_5N.HAuCl_4$.** — Blood-red warts fr. alc. — Corresp. base: No. **2**.909; m.p. 159–60°.
225	190–1	46.6	**N-Methylpyrroline, $C_5H_9N.HAuCl_4$.** — Lft. fr. dil. alc. — Corresp. base: No. **2**.1082; b.p. 79–80°.
230	191	50.3	**1,4-Diamino-2-methylpentane, $C_5H_{14}N_2.HAuCl_4$.** (Dried @ 100° after losing $2H_2O$ crystn.) — Cryst. w. 2 aq. in flat pr. — Corresp. base: No. **2**.1224; b.p. 172–3°.
235	abt. 194–5	42.2	**Guvacine, $C_6H_9O_2N.HAuCl_4$.** — Flat pr. fr. dil. HCl. — Corresp. base: No. **2**.2616; m.p. 271–2° d.
240	195–200	45.3	**4-Aminopyridine, $C_5H_6N_2.HAuCl_4$.** — Corresp. base: No. **2**.906; m.p. 154°; 158°.
245	198	28.5	**Protopine, $C_{20}H_{17}O_5N.HAuCl_4$.** — Red-br. amorph. powd. — Corresp. base: No. **2**.1005; m.p. 207°.
250	198–9	30.6	**Hyoscine, $C_{17}H_{21}O_4N.HAuCl_4$.** — Lust. OY lft. fr. h. aq. sol. — Corresp. base: No. **2**.610; m.p. 56–7°.
255	201–2	30.6	**Atroscine-Hesse, $C_{17}H_{21}O_4N.HAuCl_4$.** — Yel. lft. — Corresp. base: No. **2**.593; m.p. 50°.

No.	Melting-point (C.°)	% Au	" ADDITIONAL ELEMENTS " — N, Cl & Au — SOLID CHLOROAURATES OF:
260	205	42.6	**Tropidine, $C_8H_{13}N.HAuCl_4$.** — Yel. cryst. ppt. — Corresp. base: No. **2**.1205; b.p. 162°c.
265	206d.	49.7	**Pyrrolidine, $^{\ulcorner}C_8H_7N^{\urcorner}.HAuCl_4$.** — Yel. scales v.s.h. aq. — Corresp. base: No. **2**.1094; b.p. 87.5–88.5°.
270	208d.	33.7	**Tropacocaine, $C_{15}H_{19}O_2N.HAuCl_4$.** — Yel. ndl. — Corresp. base: No. **2**.591; m.p. 49°.
275	210–212d.	41.0	**Tropine, $C_8H_{15}ON.HAuCl_4$.** — Yel. tbl. on evapn. — Corresp. base: No. **2**.635; m.p. 63°.
280	212–3 w. efferv.	37.1	**Cytisine, $C_{11}H_{14}ON_2.HAuCl_4$.** — Br.-red ndl. — Corresp. base: No. **2**.900; m.p. 152–3°.
285	213	37.5	**rac-Ecgonine, $C_9H_{15}O_3N.HAuCl_4$.** — Ndl. — Corresp. base: No. **2**.2600–1; m.p. 251°d.
290	d.215–16 w. efferv.	47.3	**Adenine, $C_5N_5H_5.2HAuCl_4.H_2O$** — Lust. orange cryst. — Corresp. base: — No. **2**.1057; m.p. 360–5°d. (r.h.)
295	216–8	41.5	**2,3,4,5-Tetramethylpyridine, $C_9H_{13}N.HAuCl_4$.** — Yel. ndl. — Corresp. base: No. **2**.1352; b.p. 232–4°.
300	218	44.3	**N-Methylpyrrolidine, $C_5H_{11}N.HAuCl_4$.** — Yel. cryst. — Corresp. base: No. **2**.1085; b.p. 81–3°c.
305	220	37.5	**d-Ψ-Ecgonine, $C_9H_{15}O_3N.HAuCl_4$.** — Lemon yel. ndl. — Corresp. base: No. **2**.2603–1; m.p. 257°d.
310	231	20.0	**Japaconitine, $C_{34}H_{49}O_{11}N.HAuCl_4$.** — Amorph. ppt. — Corresp. base: No. **2**.998; m.p. 204°.
315	230–5(r.h.) w. efferv.	43.0	**Betaine, $C_5H_{11}O_2N.HAuCl_4$.** — Ndl. or lft. — D.s. — Corresp. base: No. **2**.2619; d.273 ± 3°u.c. (Deliq. base.)
320	233d.	29.2	**Chelerythrine, $C_{20}H_{17}O_4N.HAuCl_4$.** — Lust. brown ndl. fr. alc. — Corresp. base: No. **2**.1043; m.p. 263–4°.
·**325**	236–8	19.2	**Pseudoaconitine, $C_{36}H_{49}O_{12}N.HAuCl_4$.** — Yel. ndl. — Corresp. base: No. **2**.991; m.p. 201–2° sl.d.
330	244–5 238–9	44.5	**Choline, $C_5H_{13}ON.HAuCl_4$.** — Yel. ndl. s. in 80 pt. aq. (17.5°), more s.h; i.c. alc., eth.; s.h. alc. — Choline is a strongly alk. base $(CH_2OH).CH_2.NMe_3(OH)$, syrupy & hygroscopic, wh. gives trimethylamine when boiled w. KOH sol.
335	245d.	46.9	**Pyrazine, $C_4H_4N_2.HAuCl_4$.** — Golden lust. lft.; d.s. c. conc. HCl; decd. by aq. — Corresp. base: No. **2**.583.; misc. aq.; m.p. 47°.

CHAPTER XIV

ORDER CLXIX (169)

COMPOUNDS CONTAINING NITROGEN, CHLORINE AND PLATINUM AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

Read the " General Observations " at the head of Order 161 in Chapter XIII. What is there said of the properties of the chloroaurates, of their arrangement in the Analytical Tables, and of the general procedure to be followed in their identification, is here equally true of the chloroplatinates of Order 169 if the word chloroplatinate be everywhere substituted for chloroaurate, and the word platinum for gold. In the case of the chloroplatinates derived from species of Order II the atomic ratio of chlorine to the noble metal will, however, be 6 : 1. Any higher proportion of chlorine to platinum will indicate that the corresponding free base must belong to Order 50.

The isolation of the "corresponding bases" will often be necessary in identifying chloroplatinates. The isolation of these bases may be effected in various ways, some of which are mentioned in the following footnote.*

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* If the double-salt and the free base are not too difficultly soluble in water, one may conveniently shake the aqueous solution or suspension with silver oxide. This treatment will precipitate platinum as such, and the chlorine as silver chloride, while the base, if soluble, will pass into the filtrate.

Volatile bases may often be obtained from their chloroplatinates by distillation with sodium carbonate.

The platinum is also sometimes removed by precipitation by hydrogen sulphide, although precipitation in the cold begins very slowly. (Cf. Lassar-Cohn's Arbeitsmethoden für Organisch-chemische Laboratorien, Edition III, p. 482.) Similar methods will doubtless be found applicable for the isolation of organic bases from chloroaurates.

ANALYTICAL TABLES

OF

ORDER CLXIX (169)

COMPOUNDS CONTAINING NITROGEN, CHLORINE AND PLATINUM AS "ADDITIONAL ELEMENTS"

(CHLOROPLATINATES)

DIVISION A, SOLID SPECIES.

No.	Melting-point (C.°)	% Pt.	CHLOROPLATINATE OF: — Characterization.
50	78	29.4 (wh. anhydrous)	**d-Coniine,** $C_{16}H_{34}N_2.H_2PtCl_6.H_2O$. — Red pr. fr. abs. alc. — Corresp. base: No. **2**.1214; b.p. 166–7°c.
55	abt. 80	16.2	**Vellosine,** $C_{46}H_{56}O_8N_4.H_2PtCl_6$. — Yel.-br. cryst. — Corresp. base: No. **2**.978; m.p. 189°d.
60	d. abt. 140	28.7	**Phenylpropylamine,** $C_{18}H_{26}N_2.H_2PtCl_6$. — Yel. lft. — Corresp. base: **2**.1286; b.p. 209.5°.
65	145–7	29.4	**Hexahydrocollidine,** $C_{16}H_{34}N_2.H_2PtCl_6$ (@ 110°). — Yel. ndl. — V.s. aq.; i. alc. — Corresp. base: No. **2**.1206; b.p. 162–5.
70	155	16.0	**Chelidonine,** $C_{40}H_{38}O_{10}N_2.H_2PtCl_6$. — Yellowish ppt. — Corresp. base: No. **2**.871; m.p. 135–6°d.
75	154–6 after softening	33.6	**Ethylallylamine,** $C_{10}H_{22}N_2.H_2PtCl_6$. — Red monoclin. pr. — E.s. aq. — Corresp. base: No. **2**.1089; b.p. 84°.
80	155	25.1	**Phenylbenzylamine,** $C_{26}H_{26}N_2.H_2PtCl_6$. — Yel.-red lft. — Mod. s. aq. — Corresp. base: No. **2**.541; m.p. 32°.
85	157–8	30.7	**2-Amino-3-methyl-hexene(5),** $C_{14}H_{30}N_2.H_2PtCl_6$. — Or. lft. e.s. aq. — Corresp. base: No. **2**.1161; b.p. 133–6°.
90	165–7d.	31.2	**2-Ethylpyridine,** $C_{14}H_{18}N_2.H_2PtCl_6$. — Corresp. base: No. **2**.1183; b.p. 148.6°c.
95	171–2d.	26.6	**1-Phenylpyrazole,** $C_{18}H_{16}N_4.H_2PtCl_6.2H_2O$. — Red-yel. ndl. — Corresp. base: No. **2**.2832; b.p. 246.5°c.
100	175	29.4	**d-Coniine,** $C_{16}H_{34}N_2.H_2PtCl_6$, **(when anhydrous).** — Corresp. base: No. **2**.1214; m.p. 78.
105	176d.	33.6	**Dimethylaminoacetone,** $C_{10}H_{22}N_2.H_2PtCl_6$. — Cryst. d.s. aq. — Corresp. base: No. **2**.1140; b.p. 123.
110	176	30.7	**Diethylaminoacetone,** $C_{14}H_{30}N_2.H_2PtCl_6$. — Cryst. — Corresp. base: No. **2**.1194; b.p. 155–6°.
115	176 Frothing	27.1	**Arecoline,** $C_{16}H_{26}O_4N_2.H_2PtCl_6.5H_2O$. — Or.-red cryst. — Corresp. base: No. **2**.1319; b.p. abt. 220°.
120	177d.	27.7	**N-Methyltetrahydroquinoline,** $(C_{10}H_{13}N)_2.H_2PtCl_6$ (@ 105°). — Brick-red cryst. ppt. — Corresp. base: No. **2**.1384.
125	179	18.6	**Cusparine,** $(C_{20}H_{19}O_3N)_2.H_2PtCl_6.6H_2O$. — Corresp. base: No. **2**.717; m.p. 90°.

No.	Melting-point (C.°)	% Pt.	"ADDITIONAL ELEMENTS"—N, Cl & Pt—SOLID CHLOROPLATINATES OF:
130	179–80	30.7	**1,2,4-Trimethylpyrrolidine,** $\ulcorner(C_7H_{15}N)_2\urcorner.H_2PtCl_6$. — E.s. aq. — Corresp. base: No. **2**.1122; b.p. 111–13°.
135	d. fr. 180	28.5	**Physostigmine,** $C_{15}H_{21}O_2N_3.H_2PtCl_6$. — Stellate or.-yel. ndl. fr. B in HCl sol. — Corresp. base: No. **2**.767; m.p. 105–6°.
140	180	32.8	**Ethylisopropylamine,** $C_{10}H_{36}N_2.H_2PtCl_6$. — Or. ndl. fr. aq. — (Corresp. base: No. **2**.1079; b.p. 76°.)
145	180	36.7	**Dimethylhydroxylamine,** $C_4H_{14}O_2N_2.H_2PtCl_6$. — Red pr. — Corresp. base: No. **2**.1065; b.p. 42.4°.
150	181d.	32.0	**5-Methylpyrazole,** $C_8H_{12}N_4.H_2PtCl_6.2H_2O$. — Cryst. powd. e.s. aq.; — Corresp. base: No. **2**.1268; b.p. 204°.
160	182	30.6	**Allylisobutylamine,** $C_{14}H_{30}N_2.H_2PtCl_6$. — Red cryst. — Corresp. base: No. **2**.1141; b.p. 123°.
165	182d.	35.5	**Pyrroline,** $C_8H_{14}N_2.H_2PtCl._6$ — Or.-red ppt., — triclin. cryst. — S. c., e.s. h. aq. — Corresp. base: No. **2**.1096; b.p. 90.
170	182	29.9	**2-Methyl-5-ethylpyridine,** $(C_8H_{11}N)_2.H_2PtCl_6$. — Or.-red ndl. — 100 pt. aq. sol. @ 60° contains 0.0498 pt. — Corresp. base: No. **2**.1225; b.p. 173–4°.
175	183	26.1	**2-Benzylpyridine,** $C_{24}H_{22}N_2.H_2PtCl_6$. — Powd. s.h. aq.; — Corresp. base: No. **2**.1430; b.p. 276.7°.
180	183–4	26.4	**Ephedrine,** $(C_{10}H_{15}ON)_2.H_2PtCl_6$. — Felted e.s. ndl. fr. conc. aq. sol. — Corresp. base: No. **2**.555; m.p. 38–40°.
185	183–4	30.7	**d,l-3-(β)-Ethylpiperidine,** $C_{14}H_{30}N_2.H_2PtCl_6$. — Mod. s. cryst. — Corresp. base: No. **2**.1190; b.p. 152.6°c.
190	184d.	27.5	**1′-Aminobutylbenzene,** $C_{20}H_{30}N_2.H_2PtCl_6$. — Golden scales d.s. c. aq.; — Corresp. base: No. **2**.1325; b.p. 220.5° (th.i.)
195	185–6d.	30.1	**2-Allylpyridine,** $C_{16}H_{18}N_2.H_2PtCl_6$.(@ 100°). — Ndl. — V. d.s. aq. — Corresp. base: No. **2**.1244; b.p. 189–90°.
200	185	32.9	**1-Aminopropanediol-(2,3),** $C_6H_{18}O_4N_2.H_2PtCl_6$. — Ndl. — E.s. aq., alc.; — Corresp. base: No. **2**.1410; b.p. 265°d.
205	190–1 frothing	34.0	**1-Methylglyoxaline,** $C_8H_{12}N_4.H_2PtCl_6$. — Or.-red ndl.; s. in abt. 20 pt. c. aq.; — Corresp. base: No. **2**.1256; b.p. 197–9°.
210	190d.	56.6	**2-Ethylquinoline,** $C_{22}H_{22}N_2.H_2PtCl_6$. (@ 100°). — Tbl. d.s. aq.; — Corresp. base: No. **2**.1398; b.p. 256°–8.6°c.
215	191–3	25.7	**N-Benzylpiperidine,** $C_{24}H_{34}N_2.H_2PtCl_6$. — D.s. — Corresp. base: No. **2**.1374; b.p. 245°.
220	abt. 193d.	29.9	**Methylbenzylamine,** $C_{16}H_{22}N_2.H_2PtCl_6$. — (Dried @ 100°) — Corresp. base: No. **2**.1237; b.p. 185°.
225	193d.	35.3	**α-Crotylamine,** $C_8H_{18}N_2.H_2PtCl_6$. — Mic. tbl. — Corresp. base: No. **2**.1086; b.p. 81–5°.
230	194–5 u.c.	15.0	**Narceine,** $C_{46}H_{54}O_{16}N_2.H_2PtCl_6$. — Mic. OYTl ndl. — Corresp. base: No. **2**.2315; m.p. 170° u.c.
235	abt. 195 frothing	28.1	**3-Methylisoquinoline,** $C_{20}H_{18}N_2.H_2PtCl_6$. — Or.-yel. ndl. fr. aq. — Corresp. base: No. **2**.654; m.p. 68°.
240	190–200d.	32.6	**4-Aminopyridine,** $C_{10}H_{12}N_4.H_2PtCl_6$. — Corresp. base: No. **2**.906; m.p. 154°, 158°.
245	196–7	27.5	**Methylisopropylaniline,** $C_{20}H_{30}N_2.H_2PtCl_6$. — Corresp. base: No. **2**.1294; b.p. 212–3°.
250	197d.	29.8	**1′-Aminocresol-(2),** $C_{14}H_{18}O_2N_2.H_2PtCl_6$. — Golden ndl. — Corresp. base: No. **2**.847; m.p. 129°.
255	197	30.5	**Methylethylisobutylamine,** $C_{14}H_{30}N_2.H_2PtCl_6$. — D.s. alc. — Corresp. base: No. **2**.1111; b.p. 105°.
260	200–1d.	26.9	**1-o-Tolylpyrazole,** $C_{20}H_{20}N_4.H_2PtCl_6$. — Red-yel. pr. — Corresp. base: No. **2**.2833; b.p. 246.5°c.

No.	Melting-point (C.°)	% Pt.	" ADDITIONAL ELEMENTS " — N, Cl & Pt. SOLID CHLOROPLATINATES OF:
265	200d.	35.1	**Methylpropylamine, $C_8H_{22}N_2.H_2PtCl_6$.** — E.s. aq.; d.s. h. alc. — Corresp. base: No. **2**.1074; b.p. 62–4°.
270	abt. 200	37.2	**Trimethyleneimine, $C_6H_{14}N_2.H_2PtCl_6$.** — Or.-yel. ndl. — Corresp. base: No. **2**.1071; b.p. 63°.
275	200	28.9	**Tetrahydroquinoline, $C_{18}H_{22}N_2.H_2PtCl_6$.** (@ 100), — Red-yel. cryst. — Corresp. base: No. **2**.1385; b.p. 250°c.
280	203	25.5	**Isoamylbenzylamine, $C_{24}H_{38}N_2.H_2PtCl_6$.** — Corresp. base: No. **2**.1364; b.p. 240°.
285	203d.	32.0	**γ-Pipecoline, $C_{12}H_{26}N_2.H_2PtCl_6$.** — Lust. pr. — Corresp. base: No. **2**.1148; b.p. 126.5°–9°.
290	204 anhydrous	17.0	**Cryptopine, $C_{42}H_{46}O_{10}N_2.H_2PtCl_6$. 1 or $6H_2O$.** — Pale yel. ndl. — Corresp. base: No. **2**.1018; m.p. 217° u.c.
295	204	28.7	**1-Amino-1,3,5-trimethylbenzene, $C_{18}H_{26}N_2.H_2PtCl_6$.** — 6-sided yel. lft. — D.s. c. aq. — Corresp. base: No. **2**.1323; b.p. 230–1c°.
300	204d.	26.9	**4-Ethylquinoline, $C_{22}H_{22}N_2.H_2PtCl_6$.** — Corresp. base: No. **2**.1425; b.p. 271°–4°c.
305	204	27.1	**2-Phenylpyridine, $C_{22}H_{18}N_2.H_2PtCl_6$.** (@ 100°). — I. aq., alc. — Corresp. base: No. **2**.1422; b.p. 269°–71°.
310	205	22.4	**2,6-Diphenylpyridine, $C_{34}H_{26}N_2.H_2PtCl_6$.** — Or.-yel. ndl. fr. alc. (w. alc. of crystn. before drying). — Corresp. base: No. **2**.1731; m.p. 81°–2°.
315	205	29.3	**2,4,6-Trimethylpiperidine, $C_{16}H_{34}N_2.H_2PtCl_6$.** — Or. lft. — Pr. fr. alc. — Dec. 242°–4°. — Corresp. base: No. **2**.1177; b.p. 145°–6°.
320	205d.	30.4	**3,4-Dimethylpyridine, $C_{14}H_{18}N_2.H_2PtCl_6.2H_2O$.** — Lust. cryst. — Corresp. base: No. **2**.1208; b.p. 163.5°–4.5°.
325	205–6d.	30.7	**2,3,5-Trimethylpyrrolidine, $C_{14}H_{30}N_2.H_2PtCl_6$.** — Or.-red pr. — Corresp. base: No. **2**.1146; b.p. 126°–8°.
330	206	19.7	**i-Hyoscyamine, $C_{34}H_{46}O_6N_2.H_2PtCl_6$.** — Or. pr. — Corresp. base: No. **2**.777; m.p. 107°–8°.
335	205–7	28.9	**Styrylamine, $C_{18}H_{22}N_2.H_2PtCl_6$.** — Egg-yel. ppt. — Corresp. base: No. **2**.1357; b.p. 235°–7°.
340	206	39.1	**Dimethylamine, $C_4H_{14}N_2.H_2PtCl_6$.** — 6-sided plates. — Corresp. base: No. **2**.1061; b.p. 7.2°.
345	206–8 u.c.	19.7	**Atropine, $C_{34}H_{46}O_6N_2.H_2PtCl_6$.** — *O* cryst. fr. h. aq. — Corresp. base: No. **2**.797; m.p. 115° u.c.
350	207d.	32.1	**β-Pipecoline, $C_{12}H_{26}N_2.H_2PtCl_6$.** — Trimet. chrome-red pr. — Corresp. base: No. **2**.1144; b.p. 125°–6°c.
355	207–8	37.0	**Methylethylamine, $C_6H_{18}N_2.H_2PtCl_6$.** — Pr. — Corresp. base: No. **2**.1064; b.p. 34°–5°.
360	d.208–9	27.5	**1-Amino-tetramethylbenzene, $C_{20}H_{30}N_2.H_2PtCl_6$.** — Red.-yel. ppt. — Corresp. base: No. **2**.636; m.p. 64.5°.
365	208	31.3	**2,6-Dimethylpyridine, $C_{14}H_{18}N_2.H_2PtCl_6$.** — Or.-red monoclin. cryst. — E.s. h. aq.; — i. alc. — Corresp. base: No. **2**.1169; b.p. 142°–3.
370	208	31.3	**4-Ethylpyridine, $C_{14}H_{18}N_2.H_2PtCl_6$.** — Tbl. — R. d.s. c. aq. — Corresp. base: No. **2**.1210; b.p. 164°–6°.
375	208–9d.	31.3	**3-Ethylpyridine, $C_{14}H_{18}N_2.H_2PtCl_6$.** — Monoclin. yel.-red., lust. tbl. fr. conc. HCl. — Boiled w. aq., insol. $(C_9H_7N)_2.H_2PtCl_4$ separates (yel. lft., m.p. 240°d.) — Corresp. base: No. **2**.1209; b.p. 166°.
380	209 w. efferv.	19.9	**Oxysparteine, $C_{30}H_{48}O_2N_4.H_2PtCl_6.4H_2O$.** — Lust. ruby-red cryst. — Corresp. base: No. **2**.695; m.p. 83°–4°.
385	209–10 frothing	28.7	**2,3,4,5-Tetramethylpyridine, $C_{18}H_{26}N_2.H_2PtCl_6$.** — Wooly ndl. — Corresp. base: No. **2**.1352; b.p. 232°–4°.

No.	Melting-point (C.°)	% Pt	"ADDITIONAL ELEMENTS" — N, Cl & Pt. SOLID CHLOROPLATINATES OF:
390	209–10d.	30.0	**Benzenylamidine, $C_{14}H_{16}N_4.H_2PtCl_6.H_2O$.** — Ndl. — D.s. aq. — Corresp. base: No. **2**.679; m.p. 77°–80°.
395	210–12d.	32.0	**N-Methylpiperidine, $C_{12}H_{26}N_2.H_2PtCl_6$.** — Or.-cryst. fr. alc. — Corresp. base: No. **2**.1115; b.p. 107°.
400	blackens 210–15	35.3	**Aminocyclobutane, $C_8H_{18}N_2.H_2PtCl_6$.** — Deep yel. octahedra fr. h. aq. — Corresp. base: No. **2**.1084; b.p. 82°.
405	212	30.7	**2,6-Dimethylpiperidine, $C_{14}H_{30}N_2.H_2PtCl_6$.** — Or.-red cryst. — Corresp. base: No. **2**.1152; b.p. 128°.
410	213–4 frothing	28.2	**Arecaine, $C_{14}H_{22}O_4N_2.H_2PtCl_6$.** — Or.-yel. octahedra fr. aq. — Corresp. base: No. **2**.2506; m.p. 213°.
415	214	36.9	**Propylamine, $C_6H_{18}N_2.H_2PtCl_6$.** — D.s. c. aq. — Corresp. base: No. **2**.1067; b.p. 49°.
420	215d.	25.0	**1-Aminododecane, $C_{24}H_{54}N_2.H_2PtCl_6$.** — Yel. lft. fr. alc. — Corresp. base: No. **2**.533; m.p. 27°–8°.
425	215d.	26.8	**4-Hydroxyquinaldine, $C_{20}H_{18}O_2N_2.H_2PtCl_6$.** — Yel. ndl. — D.s. c. aq. — Corresp. base: No. **2**.1025; m.p. 231°.
430	d.215	38.1	**Cadaverine, Pentamethylenediamine, $C_5H_{14}N_2.H_2PtCl_6$.** — Or.-yel. pr. — D.s. c. aq. — Corresp. base: No. **2**.1232; b.p. 178–9°.
435	216; 207–8	24.6	**Hydrohydrastinine, $(C_{11}H_{13}NO_2)_2.H_2PtCl_6$.** — Yel. lft. — Corresp. base: No. **2**.650; m.p. 66°.
445	217	18.3	**l-Cinnamylcocoaine, $C_{38}H_{46}O_8N_2.H_2PtCl_6$.** — Cryst. ppt. — Corresp. base: No. **2**.826; m.p. 121°.
450	216–7; 195d.	32.7	**2-Methylpyridine, $C_{12}H_{14}N_2.H_2PtCl_6$.** — Yel. tbl. — Large monoclin. red pr. fr. conc. HCl. sol. — Mod. s. aq. — Corresp. base: No. **2**.1153; b.p. 129°.
455	217	30.1	**2,4,6-Trimethylpyridine, $C_{16}H_{22}N_2.H_2PtCl_6$.** — Yel. cryst. ppt. — Corresp. base: No. **2**.1223; b.p. 171–2°.
460	220	26.9	**4,8-Dimethylquinoline, $C_{22}H_{22}N_2.H_2PtCl_6$.** — Corresp. base: No. **2**.1426; b.p. 273–4°.
465	220–1d.	29.5	**Tropane, $C_{16}H_{30}N_2.H_2PtCl_6$.** — Red ndl. fr. aq. — Corresp. base: No. **2**.1216; b.p. 167°c.
470	221–3d.	28.1	**Oxysparteine, $C_{15}H_{24}ON_2.H_2PtCl_6.2H_2O$.** — Lust. ndl. — Corresp. base: No. **2**.695; m.p. 83–4°.
475	223d.	26.2	**Anhydroecgonine, $C_{18}H_{26}O_4N_2.H_2PtCl_6$.** — Compact yel.-red pr. — Corresp. base: No. **2**.2563; m.p. 230–1°d. u.c.
480	223–4d.	32.1	**1,2-Dimethylpyrrolidine, $C_{12}H_{26}N_2.H_2PtCl_6$.** — Or.-red pr. — Corresp. base: No. **2**.1103; b.p. 96°.
485	223–4		**s-Diethylethylenediamine, $C_6H_{16}N_2.H_2PtCl_6.2H_2O$.** — Or.-yel. pr. fr. h. aq. — Corresp. base: No. **2**.1184; b.p. 149–50°.
490	224	25.4	**α-Naphthoquinoline, $C_{26}H_{18}N_2.H_2PtCl_6$.** — (M.p. for aq.-free comp.) — Cryst. w. 2 Aq. — V.d.s. aq. — Corresp. base: No. **2**.598; m.p. 51°.
495	224	41.3	**Methylamine, $C_2H_{10}N_2.H_2PtCl_6$.** — Hexag. yel. tbl. — S. in 50 pt. aq.; i. abs. alc. — Corresp. base: No. **2**.109; b.p. 6.7°.
500	abt. 225	35.1	**Isobutylamine, $C_8H_{22}N_2.H_2PtCl_6$.** — Or. cryst. — Corresp. base: No. **2**.1078; b.p. 68°c.
505	d. abt. 225	25.4	**Naphthalanmorpholine, $C_{24}H_{10}O_2N_2.H_2PtCl_6$.** — Ppt. — Corresp. base: No. **2**.632; m.p. 62–3°.
510	225c. r.h. w. efferv.	27.4	**Arecaidin, $C_{16}H_{22}O_4N_2.H_2PtCl_6$.** — Yel. octahedra. — Corresp. base: No. **2**.2548; m.p. 225° u.c.
515	225	28.7	**p-Tolenylamidine, $C_{16}H_{20}N_4.H_2PtCl_6$.** — Yel. ndl. -- D.s. aq. — Corresp. base: No. **2**.753; m.p. 101–2°.

No.	Melting-point (C.°)	% Pt	"ADDITIONAL ELEMENTS" — N, Cl & Pt. SOLID CHLOROPLATINATES OF:
520	d.225	34.2	**3-Aminopyridine, $C_{10}H_{12}N_2.H_2PtCl_6$.** — Yel.-red cryst. — Corresp. base: No. **2**.637; m.p. 64°.
525	226	25	**l-Ecgonine, $C_{18}H_{30}O_6N_2.H_2PtCl_6$.** — Or. ndl. — Corresp. base: No. **2**.2449; 198d. u.c.
530	226	28.0	**Quinaldine, $C_{20}H_{18}N_2.H_2PtCl_6$.** — Or.-red pr. fr. h. aq. — Corresp. base: No. **2**.1376; b.p. 246°—7°c.
535	227-8	36.9	**Isopropylamine, $C_6H_{18}N_2.H_2PtCl_6$.** — Yel. d.s. cryst. — Corresp. base: No. **2**.1063; b.p. 32.2°.
540	abt. 228d.	29.1	**7-Aminoquinoline, $C_{18}H_{16}N_2.H_2PtCl_6$.** — Yel. cryst. ppt. — Corresp. base: No. **2**.974; m.p. 188-90°.
545	226-30	28.0	**Lepidine (Py-4-Methylquinoline), $C_{20}H_{18}N_2.H_2PtCl_6 + 2H_2O$.** — Yel. cryst. ppt., or yel.-red fr. h. HCl. — Corresp. base: No. **2**.1413; b.p. 266° (th. i.)
550	229	26.9	**2,4-Dimethylquinoline, $C_{22}H_{22}N_2.H_2PtCl_6$.** — Flesh colored ndl. fr. dil. HCl; also red ndl. w. $2H_2O$. — Corresp. base: No. **2**.1409; b.p. 264-5°.
555	blackens 230	26.9	**2,3-Dimethylquinoline, $C_{22}H_{22}N_2.H_2PtCl_6$.** — Or.-yel. ndl. — Corresp. base: No. **2**.655; m.p. 68°.
560	d.230	37.1	**Diethylethylenediamine, $C_6H_{16}N_2.H_2PtCl_6$.** — Pr. fr. alc. — Corresp. base: No. **2**.1176; b.p. 145°.
565	231	25.7	**4,6-Dimethylquinoline, $C_{22}H_{22}N_2.H_2PtCl_6.2H_2O$.** — Ndl. fr. conc. HCl. — Corresp. base: No. **2**.1435; b.p. 280°.
570	231-2	28.9	**Tetrahydroisoquinoline, $C_{18}H_{22}N_2.H_2PtCl_6$.** — Red-yel. tbl. — Corresp. base: No. **2**.1351; b.p. 232-3°.
575	231; 227-8d.	33.2	**2-Aminopyridine, $C_{10}H_{12}N_2.H_2PtCl_6.H_2O$** (fr. conc. HCl). — Yel. pr. — Corresp. base: No. **2**.612; m.p. 56°.
580	d.233	24.1	**1-Aminotridecane, $C_{26}H_{58}N_2.H_2PtCl_6$.** — Lust. yel. lft. fr. alc. — Corresp. base: No. **2**.534; m.p. 27°.
585	233	33.7	**N-Methylpyrrolidine, $C_{10}H_{22}N_2.H_2PtCl_6$.** — (Dried @ 105°). — Corresp. base: No. **2**.1085; b.p. 81-3°c.
590	234-5	31.7	**Choline, $C_{10}H_{26}O_2N_2.H_2PtCl_6$.** — Or. tbl. or ndl. — S. in 5.82 pt. aq. @ 21°; i. alc., eth. — Cryst. monoclin. fr. aq., or in reg. octahedra fr. 4 vol. aq. + 5 vol. alc. (Valuable characteristic in ident.) — Choline is a syrupy, hygroscop. strong base. — Cf. Rosenthaler p. 526 for identif. reactions.
595	d. 234-40	25.7	**3,4-Dimethylquinoline, $C_{22}H_{22}N_2.H_2PtCl_6.2H_2O$.** — Cryst. fr. dil. HCl. — Corresp. base: No. **2**.645; m.p. 65°.
600	238	25.9	**3-Methyl-2-ethylquinoline, $C_{24}H_{26}N_2.H_2PtCl_6$.** — Cryst. — Corresp. base: No. **2**.613; m.p. 56-7°.
605	d.240	32.1	**2-Amino-1-methylcyclopentane, $C_{12}H_{26}N_2.H_2PtCl_6$.** — Dark yel. ndl. — D.s. aq. — Corresp. base: No. **2**.1139; b.p. 123°.
610	240	34.3	**Pyridine, $C_{10}H_{10}N_2.H_2PtCl_6$.** — Or.-yel. ndl. — Corresp. base: No. **2**.1125; b.p. 115°c.
615	d. 242-3	36.9	**Trimethylamine, $C_6H_{18}N_2.H_2PtCl_6$.** — Or.-red cryst. — S. in 3400 pt. boiling abs. alc. — Corresp. base: No. **2**.1060; b.p. + 3.5°.
620	243 frothing, darkening fr. 239°	22.2	**Sparteine, $C_{15}H_{26}N_2.H_2PtCl_6.2H_2O$.** — Rhomb. pr. fr. HCl. — V.d.s. aq., alc. — Corresp. base: No. **2**.1456; b.p. abt. 328°c.
625	d.w.m. 250	31.2	**4-Amino-2,6-dimethylpyridine, $C_{14}H_{20}N_2.H_2PtCl_6$.** — Ppt. red.-yel. pr. — Corresp. base: No. **2**.970; m.p. 186°.
630	253.5	28.1	**4-Methylisoquinoline, $C_{20}H_{18}N_2.H_2PtCl_6$.** (Dried @ 100°) — Brown red crystal. — Corresp. base: No. **2**.1395; b.p. 256°.
635	abt. 255 d.	34.1	**Metanicotine, $C_{10}H_{14}N_2.H_2PtCl_6$.** — Yel.-br. pr. — D.s. aq. — Corresp. base: No. **2**.1428; b.p. 275-8°.

No.	Melting-point (C.°)	% Pt	"ADDITIONAL ELEMENTS" — N, Cl & Pt. SOLID CHLOROPLATINATES OF:
640	255–6d.	31.3	**3,5-Dimethylpyridine, $C_{14}H_{18}N_2.H_2PtCl_6$.** — Red cryst. — D.s. aq. — Corresp. base: No. **2**.1221; b.p. 169–70°.
645	257d.	35.4	**3-Aminotropane, $C_8H_{16}N_2.H_2PtCl_6$.** — Red pr. — Corresp. base: No. **2**.1289; b.p. 211°c.
650	257d.	35.4	**Ψ-3-Aminotropane, $C_8H_{16}N_2.H_2PtCl_6$.** — (Melts after losing $2H_2O$ @ 105°). — Corresp. base: No. **2**.1295; b.p. 213°c.
655	263d.	27.9	**Isoquinoline, $C_{18}H_{14}N_2.H_2PtCl_6.2H_2O$.** — Red.-yel. ndl. — D.s.c. aq. — Corresp. base: No. **2**.1365; b.p. 240.5°.
660	266–70d.	26.5	**4-Aminoquinoline, $C_{18}H_{16}N_4.H_2PtCl_6.2H_2O$.** — Or.-yel. ndl. fr. conc. HCl. — Corresp. base: No. **2**.901; m.p. 154°.
665	272	24.5	**ms-Methylphenanthridine, $C_{28}H_{22}N_2.H_2PtCl_6$.** — Flesh col. ndl. fr. h. dil. HCl. — Corresp. base: No. **2**.1052; m.p. 285°.
670	275	34.1	**Nicotine, $C_{10}H_{14}N_2.H_2PtCl_6$.** — (Darkens fr. 250°) — Monoclin. cryst. fr. dil. sol. — Corresp. base: No. **2**.1380; b.p. 247°c.

CHAPTER XV

ORDER CLXXIII (173)

COMPOUNDS CONTAINING NITROGEN, BROMINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

The tabulated species of this order are all aromatic bromsulphonamides with one or two exceptions. Only one species is recorded as colored. The order has no liquid species. Read the "General Observations" on Order 158 which are generally equally applicable to this order.

ANALYTICAL TABLES

OF

ORDER CLXXIII (173)

COMPOUNDS CONTAINING NITROGEN, BROMINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

DIVISION A, SOLID SPECIES.

No.	Melting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
100	115–6	**Benzenesulphondibromamide, $PhSO_2.NBr_2$.** — Red monoclin. pr. — I. c. aq.; d.s. h. aq., decg. — Alc. or eth. gives benzenesulphonamide. — E.s. chlf.; s. NaOH sol., giving $PhSO_2.NBrNa$.
150	152–3	**p-Bromphenylmercapturic Ac., $C_{11}H_{12}O_3NSBr$.** — Clear pr. fr. alc. slowly becoming opaque in air. — Alm. i. c. aq., eth.; s. 70 pt. boiling aq.; more s. in h. dil. HCl; mod. s. alc. — l-rotat. in alc. sol. — Sol. in H_2SO_4 blue when heated, color discharged by aq. or alc. — Monobasic ac.; Salts w. heavy metals i.
160	154	**3-Brombenzenesulphonamide, $Br.C_6H_4.SO_2NH_2$.** — Lft. fr. aq. — V.d.s. c. aq. — (Corresp. ac. deliq.).
170	158	**6-Brom-1,2,4-trimethylbenzene-3-sulphonamide, $Br.C_6H.Me_3(SO_2.NH_2)$.** — Ndl. fr. dil. alc.; mod. s. alc.
180	160–1; 166	**p-Brombenzenesulphonamide, $Br.C_6H_4.SO_2NH_2$.** — Ndl. — (Corresp. ac. deliq., m.p. 88°.)

No.	Melting-point (C.°)	" ADDITIONAL ELEMENTS " — NITROGEN, BROMINE AND SULPHUR. — SOLIDS.
185	161	**4-Brom-1,3-dimethylbenzene-2-sulphonamide,** $\mathbf{Br.C_6H_2.Me_2,(SO_2.NH_2)}$. — Ndl. s. alc.
190	161.4	**4,5,6-Tribrom-2-nitroaniline, —** $\mathbf{Br_3.C_6H.(NO_2),NH_2}$. — Small yel. ndl.
200	175	**3,4-Dibrombenzene-1-sulphonamide,** $\mathbf{Br_2.C_6H_3.SO_2NH_2}$. — Fine ndl. — V.d. s. c. aq.; more s. dil. alc.
210	178	**p-Dibromdiphenylthiourea,** $\mathbf{(Br.C_6H_4.NH)_2.CS}$. — Cryst. — I. aq.; d.s. c. alc., eth. — (Fr. p-bromaniline & CS_2 in alc. sol.)
220	183–4; 186	**5-Brom-1,2,4-trimethyl-6-sulphonamide,** $\mathbf{Br.C_6H.Me_3,(SO_2.NH_2)}$. — Ndl. fr. dil. alc. — Alm. i. aq.; e.s. alc.
230	187–8; 185	**3-Brompseudocumenesulphonamide,** $\mathbf{Me_3.C_6HBr.SO_2NH_2}$, **($\mathbf{Me_3}$ = 1,2,4)** — Ndl. fr. alc. — D.s. aq., c. alc.; e.s. dil. NaOH.
240	186	**o-Brombenzenesulphonamide,** $\mathbf{Br.C_6H_4.SO_2NH_2}$. — Ndl. d.s. aq. — Corresp. ac. deliq.
250	190	**2,4-Dibrombenzene-1-sulphonamide,** $\mathbf{Br_2.C_6H_3.SO_2NH_2}$. — Fine ndl. — Corresp. ac.: deliq. ndl., m.p. 110° (aq.-free).
255	190; 195	**1-Bromnaphthalene-4-sulphonamide,** $\mathbf{Br.C_{10}H_6.SO_2.NH_2}$. — Lft. fr. aq. — D.s. h. aq.; more s. h. alc. — Corresp. ac.: V.s. aq.; m.p. 138–9°.
260	193	**2,5-Dibrombenzene-1-sulphonamide,** $\mathbf{Br_2C_6H_3.SO_2NH_2}$. — Fine ndl. — V.d. s. c. aq.
265	194; 189–90	**5-Brom-1,3-dimethylbenzene-4-sulphonamide,** $\mathbf{Br.C_6H_2.Me_2,(SO_2.NH_2)}$. — Rhomb. pr. fr. alc.
270	194.5	**3-Brom-1,2,4-trimethylbenzene-6-sulphonamide,** $\mathbf{Br.C_6H.Me_3(SO_2NH_2)}$.
280	203	**3,5-Dibrombenzene-1-sulphonamide,** $\mathbf{Br_2.C_6H_3.SO_2NH_2}$. — Scales. — D.s. h. aq.; e.s. alc.
290	207	**2-Bromnaphthalene-6-sulphonamide,** $\mathbf{Br.C_{10}H_6.SO_2.NH_2}$. — Ndl. fr. alc.;e.s. abs. alc.
300	210	**4-Brombenzene-1,2-disulphonamide,** $\mathbf{Br.C_6H_3(SO_2.NH_2)_2}$. — Lft. — I.c. aq.
310	210	**3,4,5-Tribrombenzene-1-sulphonamide,** $\mathbf{Br_3.C_6H_2.SO_2NH_2}$. — Powd. — V.d. s. c. aq.
320	220	**4,6-Dibrom-1,3-dimethylbenzene-2-sulphonamide,** $\mathbf{Br_2.C_6H.Me_2(SO_2.NH_2)}$. — Ndl. — S. abs. alc., eth.
330	232–3	**1-Bromnaphthalene-5-sulphonamide,** $\mathbf{Br.C_{10}H_6.SO_2NH_2}$. — Ndl.
340	238–9	**4-Brombenzene-1,3-disulphonamide,** $\mathbf{Br.C_6H_3.(SO_2NH_2)_2}$. — Ndl. — D.s. c.; e.s. h. aq.
350	245	**2-Brombenzene-1,3-disulphonamide,** $\mathbf{Br.C_6H_3.(SO_2NH_2)_2}$. — Lft.
360	265	**6-Brom-1,3-dimethylbenzene-2,4-disulphonamide,** $\mathbf{Br.C_6H.Me_2.(SO_2NH_2)_2}$. — Ndl. fr. h. aq.

CHAPTER XVI

ORDER CCXLV (245)

COMPOUNDS CONTAINING CHLORINE, BROMINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

GENERAL OBSERVATIONS

The tabulated species of this order consist entirely of aromatic bromsulphonyl chlorides. None are liquid or are recorded as showing color. Consult T. **4**.11 for suggestions in regard to the procedure.

ANALYTICAL TABLES

OF

ORDER CCXLV (245)

COMPOUNDS CONTAINING CHLORINE, BROMINE AND SULPHUR AS "ADDITIONAL ELEMENTS"

DIVISION A, SOLID SPECIES.

No.	Melting-point (C.°)	**SPECIFIC NAMES.** — Tests and Specific Characterizations.
50	34	**3,4-Dibrombenzene-1-sulphonyl Chloride, $Br_2.C_6H_3.SO_2Cl$.** — Solidif. to ndl. in freezing mixt. — Corresp. amide: ndl.; S. dil. alc.; m.p. 175°.
60	35	**4-Bromtoluene-2-sulphonyl Chloride, $Br.C_6H_3.Me,SO_2Cl$.** — Tbl. fr. chlf. — Corresp. amide: ndl. fr. aq.; m.p. 166–7°.
70	51	**1-Brombenzene-2-sulphonyl Chloride, $Br.C_6H_4.SO_2Cl$.** — Pr. fr. eth. — Corresp. amide: ndl.; d.s. aq.; m.p. 186°.
80	54	**2-Bromtoluene-4-sulphonyl Chloride, $Br.C_6H_3.Me,SO_2Cl$.** — Corresp. amide: m.p. 151°.
90	57.5	**3,5-Dibrombenzene-1-sulphonyl Chloride, $Br_2.C_6H_3.SO_2Cl$.** — Cryst. — E.s. eth.; d.s. lgr. — Corresp. amide: scales; m.p. 203°; d.s. h. aq.; e.s. alc.
100	61	**6-Bromtoluene-3-sulphonyl Chloride, $Br.C_6H_3.Me,SO_2Cl$.** — Cryst. — Corresp. amide: m.p. 147°.
103	61	**5-Brom-1,3-dimethylbenzene-4-sulphonyl Chloride, $Br.C_6H_2.Me_2,SO_2Cl$.** — Cryst. — Corresp. amide: pr. fr. alc.; m.p. 190°; 194°.

No.	Melting-point (C.°)	"ADDITIONAL ELEMENTS" — CHLORINE, BROMINE AND SULPHUR. — SOLIDS.
110	60; 62	**4-Bromtoluene-3-sulphonyl Chloride, $\mathrm{Br.C_6H_3.Me,SO_2Cl}$.** — Cryst. fr. eth. — Corresp. amide: ndl.; m.p. 151–2°.
120	63.5–4	**2,4,6-Tribrombenzene-1-sulphonyl Chloride, $\mathrm{Br_3.C_6H_2.SO_2Cl}$.** — Rhomb. tbl. fr. eth. — Corresp. amide: ndl.; d.s. aq.; browns w. m. @ 220°.
130	71–2	**2,5-Dibrombenzene-1-sulphonyl Chloride, $\mathrm{Br_2.C_6H_3.SO_2Cl}$.** — Lft. fr. eth. — Corresp. amide: ndl.; v.d.s. c. aq.; m.p. 193°.
140	75	**p-Brombenzenesulphonyl Chloride, $\mathrm{Br.C_6H_4.SO_2Cl}$.** — Triclin. cryst. fr. eth. — B.p. 153° (15 mm.). — Amide: flat ndl.; m.p. 160–1°, 166°.
150	78–9.5	**2,4-Dibrombenzene-1-sulphonyl Chloride, $\mathrm{Br_2.C_6H_3.SO_2Cl}$.** — Rhomb. tbl. fr. eth. — Corresp. amide: ndl.; m.p. 190°.
160	86.5	**2,4,5-Tribrombenzene-1-sulphonyl Chloride, $\mathrm{Br_3.C_6H_2.SO_2Cl}$.** — Tbl. fr. eth. — Corresp. amide: lft. fr. alc.; d.s. aq.; v.s. alc.; softens @ 225°.
170	86.7	**1-Bromnaphthalene-4-sulphonyl Chloride, $\mathrm{Br.C_{10}H_6.SO_2Cl}$.** — Pr. fr. bz. — Corresp. Ac.: ndl.; e.s. aq.; m.p. 138–9°. — Corresp. amide: lft. fr. aq.; d.s. h. aq.; m.p. 190°, 195°.
180	95	**1-Bromnaphthalene-5-sulphonyl Chloride, $\mathrm{Br.C_{10}H_6.SO_2Cl}$.** — Pr. fr. bz. or eth. — E.s. chlf. — Corresp. ac.: scales; e.s. aq.; m.p. 126–7°. — Corresp. amide: ndl.; m.p. 232–3°.
190	96.5	**2,3,4,6-Tetrabrombenzene-1-sulphonyl Chloride, $\mathrm{Br_4.C_6H.SO_2Cl}$.** — Tbl. fr. alc. — Corresp. amide: powd.; d.s. h. aq.; m.p. a. 240°d.
195	97	**5,6-Dibromtoluene-3-sulphonyl Chloride, $\mathrm{Br_2,Me.C_6H_2.SO_2Cl}$.** — Ndl. fr. alc. — Corresp. amide: m.p. 214°.
200	99	**2-Brombenzene-1,3-disulphonyl Chloride, $\mathrm{Br.C_6H_3.(SO_2Cl)_2}$.** — Warts. — Corresp. amide: lft.; m.p. 245°.
210	102	**2-Bromtoluene-3,5-disulphonyl Chloride, $\mathrm{Br.C_6H_2.Me,(SO_2Cl)_2}$.** — Ndl. — — E.s. bz., eth.; d.s. pet.-eth.
220	103	**4-Brombenzene-1,3-disulphonyl Chloride, $\mathrm{Br.C_6H_3.(SO_2Cl)_2}$.** — Pr. fr. eth. — Corresp. amide: ndl.; e.s. h. aq.; m.p. 238–9°.
230	107	**4,6-Dibrom-1,3-dimethylbenzene-2-sulphonyl Chloride, $\mathrm{Br_2.C_6H.Me_2,SO_2Cl}$.** — Lft. fr. eth. — Corresp. amide: ndl. s. alc., eth.; m.p. 220°.
240	108–9	**1,4-Dibromnaphthalene-6-sulphonyl Chloride, $\mathrm{Br_2.C_{10}H_5.SO_2Cl}$.** — Ndl. — Corresp. amide: crusts; m.p. 237–8°.
250	120	**2,3,4,5-Tetrabrombenzenesulphonyl Chloride, $\mathrm{Br_4.C_6H.SO_2Cl}$.** — Rhomb. tbl. — Corresp. amide: Cryst. powd.; e.s. alc.; browns @ 240°. — Corresp. ac.; v.s. aq.; m.p. 168–9°.
260	122	**2-Bromnaphthalene-6-sulphonyl Chloride, $\mathrm{Br.C_{10}H_6.SO_2Cl}$.** — Ndl. — Corresp. amide: ndl. fr. alc.; m.p. 207°.
270	127	**2,3-Dibrombenzene-1-sulphonyl Chloride, $\mathrm{Br_2.C_6H_3.SO_2Cl}$.** — Cryst. fr. eth. — Corresp. amide: ndl. fr. alc.; e.s. alc.; d.s. aq.; m.p. 215° (browning).
280	127	**3,4,5-Tribrombenzene-1-sulphonyl Chloride, $\mathrm{Br_3.C_6H_2.SO_2Cl}$.** — Cryst. — Corresp. amide: powd.; v.d.s. aq.; m.p. 210°.
290	153–4	**Pentabrombenzenesulphonyl Chloride, $\mathrm{Br_5.C_6.SO_2Cl}$.** — Oblique rhomb. pr. — Corresp. amide: blackens w.m. @ 240–50°.
300	160	**6-Brom-1,3-dimethylbenzene-2,4-disulphonyl Chloride, $\mathrm{Br.C_6H.Me_2,(SO_2Cl)_2}$** — Cryst. fr. alc. — Corresp. amide: ndl. fr. h. aq.: m.p. 265°.
310	161	**1,4-Dibrombenzenedisulphonyl Chloride, $\mathrm{Br_2.C_6H_2.(SO_2Cl)_2}$.** — Cryst. — D. ds. eth.; alm. i. lgr. — Corresp. amide: mod. s. aq.; does not melt @ 240°.

ALPHABETICAL INDEX

This index includes the names of all compounds described in the tables of Volume IV, and also serves as a general index to the non-tabular sections of the volume.

A reference numeral directly following the name of an indexed compound is its " Serial Number"; but wherever such a numeral is preceded by " p " the reference is to a page number.

In seeking for any specific description through the index, it is best to look first for the colloquial or " trivial " name of the compound, if it has one which is widely used. Structural names, when there is no special reason for departing from the rule, have usually, but not invariably, been constructed in accordance with the principles of terminology followed in the third edition of Beilstein's Handbuch, which is often at variance with the usage of the fourth edition now in process of publication. Synonyms are used sparingly. Such literal or syllabic prefixes as *o*, *m*, *p*, *d*, *l*, *dl*, *i*, *n*, *s*, *as*, *cis*, *trans*, *fum.*, *mal.*, *O*, *C*, and the *Greek letters* have *not* been treated as integral parts of the names in which they occur in fixing the sequence of words in the alphabetical arrangement. In numerical prefixes and suffixes numerals set off with hyphens refer to *following*, and those inclosed by parentheses to *preceding* word elements. In indexing names of compounds long dashes are employed to represent words, or parts of words, repeated from corresponding positions from lines above. When such dashes stand for parts of words only, the points of division are shown in the first word of the series by hyphens.

A

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β- — — — — , **54**.730
s- — — -valerianic Ac., **54**.530
Benzene-sulphinic Ac., **7**.460
— sulphon-amide, **54**.1145
— — -dibromamide, **173**.100
— — -1,4-dimethylbenzene, **54**.1045
— — -nitramide, **54**.570
— — -hydrazide, **54**.640
— sulphonic-o-acettoluide, **54**.890
— sulphonic Ac., **7**.305
— — -acidmethylphenylhydrazide, **54**.100[illegible]
— — Anhydride, **7**.240
— — -anilide, **54**.710
— — -3-nitro-p-toluide, **54**.555
— — -phenylhydrazide, **54**.1030
— sulphonyl-p-aminophenol, **54**.880
— — -benzidine, **54**.1290
— — Chloride, **3**.585
— — -dimethylamine, **54**.125
— — -ethylamine, **54**.195
— — -hexylamine, **54**.505
— — -isobutylamine, **54**.150
— — -isopropylamine, **54**.57
i- — — -leucin, **54**.1099
— — -methylphenetidine, **54**.350
— — -m-nitranilide, **54**.995
— — -o- — , **54**.615
— — -p- — , **54**.1055
— — -phenetidine, **54**.1075
— — -propylamine, **54**.85
— — -3,4-toluylenediamine, **54**.1100
— -sulpho-p-toluide, **54**.845
p- — -sulphoprotocatechuic Ald., **7**.687
1,3,5- — -trisulphonamide, **54**.1990
— — -trisulphonyl Chloride, **70**.460
Benzenyl-amidine,Chloroplatinate, **169**.390
— -amino-β-thionaphthol, **54**.597
— -o-aminothiophenol, **54**.780
Benzidine-2,2′-disulphonamide, **54**.1920
— -mustard Oil, **54**.1695
— -sulphone, **54**.1995
-o-benzoic Ac. Sulphinid, **54**.1745
Benzo-nitrile Dihydroiodide, **51**.185
— phenone Chloride, **3**.3165

— — -phenylmercaptol, **7**.925
— — -sulphone, **7**.1160
— — -o-sulphonyl-Chloride, **70**.215
— quinone Dibromide, **4**.820
— — -dichlordiimide, **50**.995
— — Dichloride, **3**.1520
— — Tetrabromide, **4**.1605
— — Tetrachloride, **3**.2085
— -thiazole, **54**.2230
— — Mercaptan, **54**.1425
— -thiazolyl Disulphide, **54**.1520
— Trichloride, **3**.2970
Benzoyl-benzenesulphamide, **54**.1105
p- — -benzotrichloride, **3**.1215
o- — -benzoyl Chloride, **3**.685
p- — — — , **3**.1005
— -m-bromanilide, **51**.710
— -p-bromanilide, **51**.1095
— Bromide, **4**.4290
— -chloramide, **50**.877
— -m-chloranilide, **50**.930
— -p- — , **50**.1460
— Chloride, **3**.2880
— -diphenylsulphone, **7**.1155
p- — -diphenylsulphone, **7**.895
— Disulphide, **7**.845
— Sulphide, **7**.210
— -sulphobenzid, **7**.1155
— -thiourea, **54**.1365
— -o-toluenesulphonamide, **54**.729
— -p- — , **54**.1112
— -2,4,6-tribromanilide, **51**.1070
Benzsulphydroxamic Ac., **54**.905
Benzyl-amine Hydrochloride, **50**.1695
— -ammonium Benzyldithiocarbamate, **54**.830
— Bromide, **4**.4760
— Chloride, **3** 3830
— Disulphide, **7**.355
— Ethyl Sulphide, **7**.1830
— Iodide, **5**.75
— -hyposulphurous Ac., **7**.375
Benzylidene Chloride, **3**.2925
— -diethylsulphone, **7**.900
— -dimethylsulphone, **7**.1065
— -diphenylsulphone, **7**.1260
— -dithioglycollic Ac., **7**.800
Benzyl Isothiocyanate, **54**.2255
— -mercaptan, **7**.1735
— Methyl Sulphide, **7**.1740
N- — -piperidine Chloroplatinate, **169**.215
2- — -pyridine — , **169**.175
— Sulphide, **7**.215
— -sulphonamide, **54**.600
— -sulphone, **7**.1005
— -sulphonyl Chloride, **70**.195
— Sulphoxide, **7**.875
— Thiocyanate, **54**.95
— -thiourea, **54**.1315
Betaine Chloroaurate, **161**.315
— Hydrochloride, **50**.1645
Biphenyl Disulphide, **7**.995
Biphenylene Sulphide, **7**.580
Biphenyl-mercaptan, **7**.695
— Sulphide, **7**.1105
— -sulphonyl Chloride, **70**.265
Bis-p-aminophenylthiourea, **54**.1635
— ethylsulphone-butane, **7**.410
— — dimethylmethane, **7**.730
3,3-Bisethylsulphonepentane, **7**.495
Bisethylthio-2-methylpropane, **7**.1780
α,α-Bismethylsulphoneethane, **7**.780
3,3-Bis-(methylsulphone)-pentane, **7**.870
β,β- — -methylsulphonepropane, **7**.745
Bis-p-nitrophenyldiazosulphide, **54**.425
— Phenylaminophenylthiourea, **54**.1495
— -p-toluenesulphonyl-m-phenylenediamine, **54**.1385
1,5-Bis-trichlormethyltetroxan, **3**.1920
Bis-(trichlor-tert-butyl) Ether, **3**.2695
Brassidic Ac. Dibromide, **4**.432
— — Dichloride, **3**.630
Brassidyl Chloride, **3**.75
Bromacenaphthene, **4**.405
1-Bromacenaphthenone, **4**.1110
Bromacet-aldehyde, **4**.3050
— — -dimethylacetale, **4**.4670
Bromacetale, **4**.4670; **4**.4150
Bromacetamide, **51**.463
N- — , **51**.615
4-Brom-2-acetamino-1,3-xylide, **51**.810
Brom-acetanilide, **51**.780
m- — -acetanilide, **51**.430
o- — — , **51**.520
p- — — , **51**.945
Bromacetic Ac., **4**.370
3-Brom-β-acetnaphthalide, **51**.1005
Bromacetole, **4**.3080
Bromacetone, **4**.4025
Bromacetonitrile, **51**.1320
1^2-(ω)-Bromacetophenone, **4**.375
(anti)-1^2- — -oxime, **51**.502
(syn)- — — — , **51**.447
Bromaceto-o-toluide, **51**.635
— -p- — , **51**.940
5-Brom-o-acettoluide, **51**.910
Bromacetyl Bromide, **4**.4080
Bromacetylene, **4**.3000
α-Brom-acrolein, **4**.3090
α- — -acrylic Ac., **4**.635
β- — — — , **4**.1155
α- — -adipic — , **4**.1293
β- — — — , **4**.1412
Bromal, **4**.4170
— Hydrate, **4**.420
x-Bromalizarine, **4**.1930
Brom-β-aminoalizarine, **51**.1235
4-Brom-3-aminobenzoic Ac., **51**.1164
3- — -2- — — , **51**.978
4- — — — — — , **51**.1162
5- — — — — — , **51**.1133
6- — -3- — — , **51**.987
2- — -4-aminophenol, **51**.919
4- — -2- — Ethyl Ether, **51**.182
— — — — — Methyl — , **51**.507
5- — — amino-1,3-xylene, **51**.135
m-Bromaniline, **51**.55
o- — , **51**.85
p- — , **51**.225
p-Bromanisole, **4**.4842
Bromanthracene, **4**.979
1-Brom-anthraquinone, **4**.1695
α- — -arachidic Ac., **4**.550
m- — -azobenzene, **51**.255
o- — — , **51**.425
p- — — , **51**.445
3- — 4,4′-azotoluene, **51**.760
α- — -behenic Ac., **4**.655
μ- or ν-Brombehenic Ac., **4**.242
m-Brom-benzaldehyde, **4**.4815
o- — — , **4**.110
p- — — , **4**.470
m- — — -phenylhydrazone, **51**.835
o- — benzamide, **51**.895
p- — — , **51**.1000
Brombenzene, **4**.4690
o- — -azophenol, **51**.405

p- — — , **51**.905
2- — -1,3-disulphonamide, **173.350**
4- — — -1,2- — , **173**.300
4- — — -1,3- — , **173**.340
2- — — -1,3-disulphonyl Chloride, **245**.200
4- — — -1,3- — — , **245**.220
3- — — -sulphonamide, **173**.160
o- — — — , **173**.240
p- — — — , **173**.180
p- — — -sulphonyl Chloride, **245.140**
1- — — -2- — — , **245**.70
m- — -benzoic Ac., **4**.1455
o- — — — , **4**.1400
p- — — — , **4**.1950
2- — -benzophenone, **4**.290
3- — — , **4**.780
Brombenzoquinone, **4**.450
o-Brom-benzyl Alc., **4**.760
p- — — — , **4**.735
m- — — Bromide, **4**.265
o- — — — , **4**.155
p- — — — , **4**.530
o- — -biphenyl, **4**.4890
p- — — , **4**.870
μ- or -*ν*- — -brassidic Ac., **4**.195
1-Brom-butadiene-(1,3), **4**.4565
— — -butanone-(2), **4**.4675
3- — — — , **4**.4645
1- — -butene-(2), **4**.4580
2- — — -(1), **4**.4550
(cis)-2- — — -(2), **4**.4545
(Higher-boiling)2-Brombutene-(2), **4**.4570
β-Brom-butyric Ac., **4**.100
d,l-*α*- — — — , **4**.55
γ- — — — , **4**.175
α- — — -*α*-naphthalide, **51**.880
α- — -butyryl-*β*- — , **51**.795
α- — -butyro-p-toluide, **51**.735
β- — -n-caproic Ac., **4**.200
α- — -cerotic Ac., **4**.617
Bromcinnamic Ac., **4**.1952
α- — — ., **4**.1292
(Allo-)-*α*- — — ., **4**.1212
β-Bromcinnamic Ac., **4**.1307
(Allo-)-*β*- — — ., **4**.1467
m-Bromcinnamic — ., **4**.1642
o- — — ., **4**.1787
1^{2}- — Ald., **4**.685
3-Bromcresol-(4), **4**.4280
5- — -(2), **4**.585
Brom-cyclobutane, **4**.4587
4- — -dimethyl-aniline, **51**.155
3- — — — , **51**.1345
1′-Brom-1,3-dimethylbenzene, **4**.4805
1′- — -1,4- — , **4**.205
2- — -1,3- — , **4**.4800
2- — -1,4- — , **4**.4795
4- — -1,3- — , **4**.4775
5- — — — , **4**.4780
6- — — — -2,4-disulphonamide, **173**.360
6- — — — -2,4-disulphonyl Chloride, **245**.300
4- — — — -2-sulphonamide, **173**.185
5- — — — -4- — , **173**.265
3- — -2,2-dimethyl-butane, **4**.120
2- — -2,3- — — , **4**.122
1- — -2,2- — -propane, **4**.4595
α- — -*α*,*β*- — -succinic Ac., **4**.877
α^{1}- — -*α*,*α*- — — — , **4**.1444
2- — -4,6-dinitro-aniline, **51.887**
3- — -1,2, — -benzene, **51**.555
4- — — — — , **51**.205
— — -1,3- — — , **51**.270
— — -3,5- — -benzoic Ac., **51.990**

— — -3,5- — -benzoic Ac., **51**.990

1- — -4,5- — -naphthalene, **51**.976
— — -4,8- — — , **51**.839
2- — -4,6- — -phenol, **51**.680
4- — -2,6- — — , **51**.410
4- — -3,5- — -toluene, **51**.675
Bromdiphenic Ac., **4**.1905
1^{2}-Bromdiphenacyl, **4**.1500
4-Bromesitylenic Ac., **4**.1392
2-Bromethanol-(1), **4**.4075
Brom-ethene, **4**.3010
— -ethine, **4**.3000
β- — -ethyl Acetate, **4**.4125
β- — — -amine, **51**.915
o- — — -benzene, **4**.4765
p- — — — , **4**.4770
Bromfumaric Ac., **4**.1672
β-Brom-glutaric Ac., **4**.1335
1- — -heptane, **4**.4740
2- — — , **4**.4720
1- — -heptene-(1), **4**.4715
1- — -hexane, **4**.4685
2- — — , **4**.4655
α- — -hexadecane-*α*-carbonic Ac., **4**.392
2- — -hexanol-(3), **4**.4750
p- — -hydrazobenzene, **51**.645
Bromhydroquinone, **4**.1050
3-Brom-4-hydroxy-benzaldehyde, **4**.1235
3- — — — -benzoic Ac., **4**.1410
2,3-Bromhydroxynaphthoquinone, **4**.1725
m-Bromisatine, **51**.1215
N-Bromisobutyramide, **51**.482
α- — , **51**.870
α-Bromisobutyranilide, **51**.380
α-Bromisobutyric Ac., **4**.350
α- — Ald., **4**.3075
(Para)-*α*-Bromisobutyric Ald., **4**.1275
α-Bromisobutyro-*α*-naphthalide, **51**.650
α- — -*β*- — , **51**.800
α- — -p-toluide, **51**.460
α-Bromisobutyryl Bromide, **4**.4130
Bromisophthalic Ac., **4**.2027
2-Brom-isopropyl-benzene, **4**.4790
4- — — — , **4**.4825
α- — -isosuccinic Ac., **4**.1550
β- — -isovalerianic Ac., **4**.695
d-*α*-Brom — — , **4**.300
(i)*α*- — — — , **4**.310
β-Bromlactic Ac., **4**.850
Brom-maleic Ac., **4**.1340
— -malonic Ac., **4**.1100
α-Brommelissic Ac., **4**.757
2-Brommesitylenic Ac., **4**.1808
3-Brom-4-methoxybenzoic Ac., **4**.1807
4-Brommethylaniline, **51**.1350
1-Brom-2-methylbutane, **4**.4625
3- — — — , **4**.4605
1- — — -methylbutene, **4**.4630
Brommethyl Eth., **4**.3035
2-Brom-1-methyl-4-isopropylbenzene, **4.4865**
3- — — — — — , **4**.4855
1- — -2- — -pentane, **4**.4650
5- — — — — , **4**.4665
1- — — — -propene, **4**.4555
α-Brommyristic Ac., **4**.270
1-(*α*)-Bromnaphthalene, **4**.4875
2-(*β*)- — , **4**.495
1-Bromnaphthalene-4-sulphonamide, **173.255**
— — -5- — , **173**.330
2- — -6- — , **173**.290
1- — -4-sulphonyl Chloride, **245.170**
1- — -5- — — , **245**.180
2- — -6- — — , **245**.260

1-Bromnaphthol-(2), **4**.795
4- — -(1), **4**.1260
6- — -(2), **4**.1265
8- — -(1), **4**.505
2-Brom-α-naphthoquinone, **4**.1285
3-Bromnaphthoquinone-(1,2), **4**.1635
6- — — , **4**.1420
4-Brom-α-naphthylamine, **51**.560
4- — -2-nitroacetanilide, **51**.562
4- — -3- — , **51**.842
5- — -2- — , **51**.822
6- — -3- — , **51**.988
4- — -2-nitro-1-acetnaphthalide, **51**.1185
1′- — -3-nitroacetophenone, **51**.495
1^2- — -o- — , **51**.160
1^2- — -4- — , **51**.510
3- — -4- nitroaniline, **51**.582
3- — -6- — , **51**.882
4- — -2- — , **51**.622
4- — -3- — , **51**.788
4- — -3-nitrobenzaldehyde, **51**.565
5- — -2- — , **51**.295
m-Bromnitrobenzene, **51**.165
o- — , **51**.105
p- — , **51**.755
2-Brom-4-nitrobenzoic Ac., **51**.939
2- — -5- — — , **51**.986
3- — -2- — — , **51**.1205
3- — -4- — — , **51**.1065
3- — -6- — — , **51**.823
4- — -3- — — , **51**.1085
5- — -2-nitrocinnamic Ac., **51**.977
3- — -2-nitrocinnamylmethylketone, **4**.1540
1- — -1-nitroethane, **51**.1310
Bromnitromethane, **51**.1315
1,4-Bromnitronaphthalene, **51**.402
1,8- — , **51**.537
4-Brom-2-nitronaphthalene, **51**.789
5- — -1- — , **51**.727
4- — -2-nitro-1-naphthylamine, **51**.1090
Brom-3-nitrophenol, **51**.860
2-Brom-4- — , **51**.625
4- — -2- — , **51**.440
5- — -2- — , **51**.110
6- — -2- — , **51**.240
5- — -2-nitrophenyllacticacidketone, **51**.543
3- — -5-nitrosalicylic Ac.-(1), **51**.1160
5- — -3- — — , **51**.985
4- — nitroso-methylaniline, **51**.280
2- — -2- — -propane, **51**.1300
1′- — -3-nitrotoluene, **51**.175
1′- — -4- — , **51**.530
2- — -4- — , **51**.305
2- — -5- — , **51**.310
3- — -5- — , **51**.340
4- — -2- — , **51**.115
4- — -3- — , **51**.80
2-Bromnonane, **4**.4802
1-Bromoctane, **4**.4785
2- — , **4**.4755
Bromoctylbenzene, **4**.4885
Bromoform, **4**.4055
Bromal, **4**.930
Bromopianic Ac., **4**.1750
Bromorcinol, **4**.1315
5-Brom-8-oxyquinoline, **51**.730
α-Brompalmitic Ac., **4**.380
1-Brom-pentadecane, **4**.85
2- — pentadecanoic(1) Ac., **4**.275
Brom-pentaethylbenzene, **4**.345
1-Brompentane, **4**.4640
2- — , **4**.4600
Brom-phenetidine, **51**.182
— -phenetole, **4**.4852
m-Bromphenol, **4**.180
o- — , **4**.4250
p- — ,**4**.565
4′-Bromphenyl-benzoic Ac., **4**.1715
p- — Dibromsalicylate, **4**.1720
p- — -hydrazine, **51**.600
p- — -hydroxylamine, **51**.470
α-Brom-β-phenyl-β-hydroxypropionic Ac., **4**.1240
p-Bromphenyl-mercapturic Ac., **173**.150
p- — -nitromethane, **51**.210
Iso-p- — — , **51**.450
3-Bromphthalic Ac., **4**.1640
4- — — ., **4**.1560
Brompicrin, **51**.50
Brompicrotoxinin, **4**.1980
Brompiperonal, **4**.1280
2-Brom-propane, **4**.4510
1- — -propanol-(2), **4**.4680
1-(Iso-α-)Brompropene, **4**.4515
1-Brompropene-(1), **4**.4520
2- — , **4**.4505
N-Brom-propionamide, **51**.337
α- — -propionanilide, **51**.525
α- — -propionyl Bromide, **4**.4090
3- — -propine-(1), **4**.3040
d,l-α-Brompropionic Ac., **4**.135
β-Brompropionic Ac., **4**.545
α- — -α -naphthalide, **51**.920
α-Brompropion-o-toluide, **51**.790
α- — -p- — , **51**.1305
α-Brompropionyl Bromide, **4**.4090
α- — -β-naphthalide, **51**.980
4-Brom-propiophenone, **4**.335
2- — -1-propylbenzene, **4**.4840
4- — -propylbenzene, **4**.4830
3- — -pseudocumenesulphonamide, **173**.230
Brompurpurine, **4**.2020
2-Brom-pyridine, **51**.1332
3- — — , **51**.1330
2- — -quinoline, **51**.130
3- — — , **51**.1355
4- — — , **51**.75
5- — — , **51**.150
6- — — , **51**.1360
8- — — , **51**.1365
Bromsalicin, **4**.1490
3-Bromsalicylic Ac-(1), **4**.1820
5- — — — , **4**.1515
5- — Ald., **4**.995
α-Bromstearic Ac., **4**.500
β- — — ., **4**.415
β-Brom-stilbene, **4**.170
1^2- — -styrene, **4**.4835
α- — -suberic Ac., **4**.978
d,l- — -succinic — ., **4**.1470
l- — — — ., **4**.1590
Bromterephthalic Ac., **4**.2042
3-Brom-1,2,4,5-tetramethylbenzene, **4**.540
4- — -1,2,3,5- — , **4**.4870
5- — -1,2,3,4- — , **4**.165
4- — -1,3,5,8-tetranitronaphthalene, **51**.1199
4- — -1,3,6,8- — , **51**.1016
6- — Bromthymol, **4**.452
m-Bromtoluene, **4**.4745
o- — , **4**.4195
p- — , **4**.145
2- — disulphonyl Chloride, **245**.210
4- — -2-sulphonyl — , **245**.60
2- — -4-sulphonyl Chloride, **245**.80
4- — -3- — — , **245**.110
6- — -3- — — , **245**.100
2-Bromtoluic Ac., **4**.1747

3- — — ., **4**.1347
4-Brom-m-toluic Ac., **4**.1435
6- — — — — ., **4**.1780
4- — -o- — — ., **4**.1555
5- — -o- — — ., **4**.1685
m- — -α- — — ., **4**.945
o- — -α- — — ., **4**.990
p- — -α- — — ., **4**.1140
2- — -4-toluidine, **51**.70
3- — -4- — , **51**.65
4- — -m- — , **51**.95
5- — -m- — , **51**.100
6- — -m- — , **51**.315
5- — -o- — , **51**.200
4- — -toluquinone-(2,5), **4**.1005
α- — -tridecylic Ac.-(2,5), **4**.150
3- — -1,2,4-trimethylbenzene, **4**.4850
5- — -1,2,4- — , **4**.705
Brom-1,3,5- — , **4**.4845
1-Brom-1,3,5- — ,**4**.220
3- — -1,2,4- — -6-sulphonamide, **173**.270
6- — -1,2,4- — -3- — , **173**.170
2- — -2,2,3- — -trimethylbutane, **4**.1422
5- — -1,2,4-trimethyl-6-sulphonamide, **173**.220
3- — -2,4,6-trinitrotoluene, **51**.840
Bromural, **51**.890
α-Brom-n-valerianic Ac., **4**.490
δ-Brom-n-valerianic Ac., **4**.240
Bromvanillin, **4**.1485
4-Brom-1,2-xylene, **4**.4810
Butyl Bromide, **4**.4875
tert-Butyl Bromide, **4**.4525
— — Chloride, **3**.3260
n- — Chloracetate, **3**.3820
Butylchloral Hydrate, **3**.765
n-Butyl Chloride, **3**.3320
n- — Dichloracetate, **3**.2805
Butyl Iodide, **5**.800
Sec- — — , **5**.770
tert- — — , **5**.740
n- — Isothiocyanate, **54**.2180
sec- — — , **54**.2160
tert- — — , **54**.2135
n-Butylmercaptan, **7**.1430
sec- — , **7**.1400
tert- — , **7**.1380
n-Butyl Sulphide, **7**.1670
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5- — -α- — — ., **3**.2120
8- — -α- — — ., **3**.1750
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2- — -6- — — ., **50**.1275
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2- — -3,5-disulphonyl Chloride, **70**.160
2- — -4,5- — — , **70**.420
2- — -4,6- — — , **70**.180
4- — -2,5- — — , **70**.365
4- — -2,6- — — , **70**.240
4- — -3,5- — — , **70**.285
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4- — -2- — — , **70**.55
4- — -3- — — , **70**.100
6- — -3- — — , **70**.115
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5- — -o- — — ., **3**.1780
6- — -o- — — ., **3**.1605
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3- — -p- — — ., **3**.1610
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2- — -p- — , **50**.65
3- — -p- — , **50**.1930
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d- — Hydrochloride, **50**.1565
Creatinine Chloroaurate, **161**.175
Crotonic Ac. Dibromide, **4**.830
— — Dichloride, **3**.585
Crotonyl Chloride, **3**.2525
Crotonylene Bromide, **4**.4060
α-Crotylamine Chloroplatinate, **169**.225
Crotyl Bromide, **4**.4580
— Chloride, **3**.3315
— Iodide, **5**.805
Cryptopine Chloroplatinate, **169**.290
Cryst. polymeric Chloraldehyde, **3**.905
Cumarin Bromide, **4**.1000
Cuminyl Chloride, **3**.4040
Cumyl — , **3**.4020
Cusparidine Chloroaurate, **161**.165
Cusparine — , **161**.125
m-Cyanbenzal Chloride, **50**.1990
o- — — , **50**.1977
p- — — , **50**.1992
o-Cyanbenzo-trichloride, **50**.676
o-Cyanbenzyl Bromide, **51**.302
p- — — , **51**.647
m- — Chloride, **50**.375
o- — — , **50**.302
p- — — , **50**.490
Cyanogen Bromide, **51**.647
— Chloride, **50**.1795
— Sulphide, **54**.205
Cyanthioformamide, **54**.424
Cyanuric Chloride, **50**.1185
Cytisine Chloroaurate, **161**.280

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Dehydrothio-p-toluidine, **54**.1585
— -m-xylidene, **54**.598
Dekahydroquinoline Hydrochloride, **50**.1715
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s-Diacenaphthenylthiourea, **54**.1595
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— Disulphide, **7**.60
— Sulphide, **7**.1475
— -thioaniline, **54**.1710
Diallyl-carbinol Chloride, **3**.3645
— Hexasulphide, **7**.390
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4,4′-Diaminodibenzyl Disulphide, **54**.525
Di-4-amino-1,3-dimethylthiourea, **54**.1175
p-Diamino-diphenylmethanesulphone, **54**.1725
1,4- — -2-methylpentane, Chloroaurate, **161**.230
o-Diaminophenyl Disulphide, **54**.460
p- — — , **54**.370
o- — Sulphide, **54**.630
4-Diaminotolyl Sulphide-(3), **54**.605
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m-Diazobenzenesulphonic Ac., **54**.210
2-Diazothio-5-dimethylaniline, **54**.335
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— -sulphonylanilide, **54**.955
— -sulphonylbenzidine, **54**.1795
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Dibenzenesulphonyl-hydrazide, **54**.1805
— Sulphide, **7**.885
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Dibenzylamine Hydrochloride, **50**.1700
sym-Dibenzylthiourea, **54**.1120
Dibromacetaldehyde, **4**.4045
Dibromacetamide, **51**.900
N- — , **51**.540
Dibromacetic Ac., **4**.355
s- — Anhydr., **4**.4365
2,4-Dibrom-acetnaphthalide, **51**.1165
s-Dibromacetone, **4**.130
$1^2,1^2$-(ω)-Dibromacetophenone, **4**.210
1^2,4- — , **4**.1040
Dibromacetyl-anilide, **51**.815
— Bromide, **4**.4245
Dibromacetylene, **4**.3025
α,β-Dibromacrylic Ac., **4**.805
β,β- — — ., **4**.810
β,β′-Dibromadipic Ac., **4**.1718
Dibromalizarine, **4**.1565
3,4-Dibrom-2(or 6)-aminobenzoic Ac., **51**.1167
3,5- — -2-amino-1,4-dimethylbenzene, **51**.230
3,6- — -2- — -1,4- — , **51**.480
2,6- — -4- aminophenol, **51**.1017
4,6- — -2- — , **51**.519
2,4- — -aniline, **51**.520
2,5- — — , **51**.145
2,6- — — , **51**.370
3,4- — , **51**.335
3,5- — , **51**.170
9,10-Dibromanthracene, **4**.1837
Dibromanthracene Tetrabromide, **4**.1623
α-Dibromanthraquinone, **4**.1837
β- — , **4**.2015
2,2′-(o)-Dibromazobenzene, **51**.1010
3,3′-(m) — , **51**.745
4,4′-(p) — , **51**.1100
3,3′-Dibrom-4,4′-azotoluene, **51**.300
3,3′-Dibromazoxybenzene, **51**.620
4,4′- — , **51**.960
μ,ν-Dibrombehenic Ac., **4**.280
2,4-Dibrombenzamide, **51**.1050
2,6- — , **51**.1025
m-Dibrombenzene, **4**.4305
o- — , **4**.4330
p- — , **4**.865
1,4- — -disulphonyl Chloride, **245**.310
2,4-Dibrombenzene-1-sulphonamide, **173**.250
2,5- — -1- — , **173**.260
3,4- — -1- — , **173**.200
3,5- — -1- — , **173**.280
2,3-Dibrombenzene-1-sulphonyl Chloride, **245**.270
2,4- — -1- — — , **245**.150
2,5- — -1- — — , **245**.130
3,5- — -1- — — , **245**.50
2,2′-Dibrombenzidine, **51**.885
3,3′- — , **51**.570
2,3-Dibrombenzoic Ac., **4**.1405
2,4- — — ., **4**.1535
2,5- — — ., **4**.1445
2,6- — — ., **4**.1385
3,4- — — ., **4**.1875
3,5- — — ., **4**.1825
2,4′-Dibrombenzophenone, **4**.385
3,3′- — , **4**.1370
4,4′- — , **4**.1600
2,5-Dibrombenzoquinone, **4**.1690
2,6- — , **4**.1290
Dibrom-α,α-binaphthyl, **4**.1810
p-Dibrombiphenyl, **4**.1525
3,5-Dibrom-2-bromacettoluide, **51**.1120
1,3-Dibrombutane, **4**.4160
1,4- — , **4**.4260
2,2- — , **4**.4050
2,3- — , **4**.4115; **4**.4120
2,3-Dibrombutanol-(1), **4**.185
1,2-Dibrombutene-(1), **4**.4085
(α-form)-1,4-Dibrombutene-(2), **4**.430
(higher boiling) 2,3-Dibrombutene-(2), **4**.4070

2,3-Dibrombutylene-(2), **4**.4060
α,β-Dibrombutyric Ac., **4**.475; **4**.830
β,γ- — — ., **4**.360
α,β-Dibromcaproic Ac., **4**.675
Dibromchrysene, **4**.2005
(α)-1′,1^2-Dibromcinnamic Ac., **4**.1342
(β)-1′,1^2- — — ., **4**.977
3,5-Dibromcresol-(2), **4**.445
ω-Dibromcumene, **4**.955
2,2-Dibrom-desoxybenzoin, **4**.1105
Dibrom-1,5-diaminoanthraquinone, **51**.1220
4,4′-Dibromdiazoaminobenzene, **51**.855
6,6-Dibromdiketohydrindene, **4**.1630
1′,2′-Dibrom-1,2-dimethylbenzene, **4**.925
1,3- — -1,3- — , **4**.745
2,4- — -1,3- — , **4**.4385
2,5- — -1,4- — , **4**.715
3,4- — -1,2- — , **4**.4405
4,5- — -1,2- — , **4**.840
4,6- — -1,3- — , **4**.690
4,6- — -1,3- — -2-sulphonamide, **173**.320
4,6- — -1,3- — -2-sulphonyl Chloride, **245**.230
2,3-Dibrom-2,3-dimethylbutane, **4**.1707
3,3- — -2,2- — , **4**.1687
3,4- — -2,3-dimethyl-butene-(1), **4**.365
2,5- — -2,5- — -hexane, **4**.645
1,4- — -2,4- — -pentane, **4**.640
1,3- — -2,2- — -propane, **4**.4205
2,4-Dibromdinitrobenzene, **51**.665
2,5-Dibrom-1,3-dinitrobenzene, **51**.535
3,6- — -1,2- — , **51**.930
4,5- — -1,2- — , **51**.640
4,5- — -1,3- — , **51**.265
3,5- — -2,6- dinitrophenol, **51**.865
Dibrom-diphenylamine, **51**.607
— diphenylthiourea, **173**.210
— ditolylmethane, **4**.1165
— isophthalic Ac., **4**.1457
1,1-Dibrom-ethane, **4**.3065
1,2- — — , **4**.4015
2,2- — ethanol-(1), **4**.4190
1,1- — ethene, **4**.3045
α,α- — ethylamine, **51**.125
1^2,2′- — ethylbenzene, **4**.710
4′,4^2- — ethyltoluene, **4**.315
Dibrom-eugenol Bromide, **4**.1200
— fluoresceine, **4**.1990
— fumaric Ac., **4**.1835
(α)-2,5-Dibromfurane, **4**.75
Dibrom-furane α-Tetrabromide, **4**.1060
— gallic Ac., **4**.1345
meso-α,α′-Dibromglutaric Ac., **4**.1570
rac.-α,α′- — — ., **4**.1373
1,7-Dibrom-heptane, **4**.4380
1,6- — -hexane, **4**.4355
2,3- — — , **4**.4255
2,5- — — (meso), **4**.235
2,2′- — -hydrazobenzene, **51**.350
3,3′- — — , **51**.610
4,4′- — — , **51**.785
Dibromhydrindene, **4**.305
α-Dibrom-hydrine, **4**.4300
β- — — , **4**.4295
2,5(?)-Dibromhydroquinone, **4**.1675
2,6- — , **4**.1520
Dibromhydroxyanthraquinone, **4**.1770
2,4-Dibrom-1-hydroxyanthraquinone, **4**.1885
3,5- — -4-hydroxybenzaldehyde, **4**.1655
3,5- — -4- hydroxybenzoic Ac., **4**.2000
Dibromidryl, **4**.1755
Dibrom-isatine, **51**.1210
— -isobutylene, **4**.4095
α,β-Dibromiso-butyric Ac., **4**.115
α,β- — -succinic Ac., **4**.980
α,β-Dibromlactic Ac., **4**.960
β,β-Dibromlevulinic Ac., **4**.1135
Dibrommaleic Ac., **4**.1137
— — Anhydr., **4**.1232
Dibrommalonic Ac., **4**.1330
1′,3′-Dibrom-mesitylene, **4**.620
Dibrommesitylenic Ac., **4**.1717
3,5-Dibrom-4-methoxybenzoic Ac., **4**.1790
1,2- — -2-methylbutane, **4**.4155
2,3- — -2- — , **4**.4165
4,4- — -2- — , **4**.4175
s- — -methyl Eth., **4**.4100
2,5- — -1-methyl-4-isopropylbenzene, **4**.4395
2,2- — -2-methylpentane, **4**.4210
1,2- — -2-methylpropane, **4**.4065
1,3- — -2- — , **4**.4180
1,2- — -naphthalene, **4**.630
1,4(β)-Dibromnaphthalene, **4**.775
1,5(γ)- — , **4**.1305
1,6- — , **4**.535
1,7- — , **4**.720
1,8- — , **4**.1035
2,6-(ε)- — , **4**.1465
2,7-(δ)- — , **4**.1355
1,4- — -6-sulphonyl Chloride, **245**.240
1,6-Dibromnaphthol-(2), **4**.1010
2,4- — -(1), **4**.1080
2,3-Dibrom-α-naphthoquinone, **4**.1815
3,4-Dibromnaphthoquinone-(1,2), **4**.1610
α — , **4**.1425
2,4-Dibrom-α-naphthylamine, **51**.700
1,4- — -β- — , **51**.595
1,6- — -β- — , **51**.715
1,1-Dibrom-2-nitroacetophenone, **51**.400
1,1- — -3- — , **51**.195
1,1- — -4- — , **51**.250
3,5- — -2- nitroaniline , **51.999**
2,6- — -4- — , **51**.1097
2,4- — -6- — , **51**.757
3,4- — -6- — , **51**.1099
2,4-Dibromnitrobenzene, **51**.215
2,5- — , **51**.365
2,6- — , **51**.385
3,4- — , **51**.185
3,5- — , **51**.580
3,5-Dibromnitrobenzoic Ac., **51**.937
3,5-Dibrom-2-nitrobenzoic — ., **51**.1192
3,4- — -2(or 6)- — — ., **51**.936
1,1-Dibromnitroethane, **51**.1325
1,4-Dibrom-2-nitronaphthalene, **51**.667
5,8- — -1- — , **51**.662
2,6-Dibrom-4-nitrophenol, **51**.830
4,6- — -2- — , **51**.660
1′,1′- — -2-nitrotoluene, **51**.120
1′,1′- — -3- — , **51**.550
1′,1′- — -4- — , **51**.355
2,3- — -s- — , **51**.585
2,5- — -3- — , **51**.260
2,5- — -4- — , **51**.415
2,6- — -4- — , **51**.180
3,4- — -5- — , **51**.220
4,5- — -2- — , **51**.420
1,9- — -nonane, **4**.4410
1,8- — -octane, **4**.95
5,7- — -8-oxyquinoline, **51**.1055
α,β- — -palmitic Ac., **4**.615
1,2- — -pentane, **4**.4225
1,5- — — , **4**.4315
2,3- — — , **4**.4185
1,2- — -pentene, **4**.4230
Dibromphenanthrenequinone, **4**.1870
2,4-Dibromphenol. **4**.250

2,6- —, **4**.440
3,4- —, **4**.755
3,5- —, **4**.725
Dibromphenyl Ether, **4**.485
2,4- — -hydrazine, **51**.475
2,5- — — , **51**.505
3,4- — — , **51**.575
Dibromphloron,(p-Xyloquinone), **4**.1680
3,6-Dibromphthalic Ac., **4**.1310
Dibrompicene, **4**.2035
α,α′-Dibrompimelic Ac., **4**.1365
1,1-Dibrompropane, **4**.4010
1,2- — , **4**.4035
2,2- — , **4**.3080
1,3-Dibrompropanol-(2), **4**.4300
2,3- — -(1), **4**.4295
1,1-Dibrompropene-(1), **4**.3095
1,2- — - (1), **4**.4005
α,α-Dibrompropionic Ac., **4**.515
α,β- — — ., **4**.580
α,α- — Ald., **4**.4030
β,β- — Ac. **4**.670
N-Dibrompropyl-c,c-diethylbarbituric Ac., **51**.750
2,3-Dibrompropylene-(1), **4**.4040
Dibrompropylene Bromide, **4**.4340
2,4-Dibrompurpuroxanthin, **4**.1865
(α)-3,5-Dibrompyridine, **51**.623
3,4-Dibrompyromucic Ac., **4**.1710
3,5- — — ., **4**.1545
3,6-Dibromquinoline, **51**.770
2,4-Dibromresorcinol. **4**.890
(?)- — , **4**.1070
Dibromretene, **4**.1660
3,5-Dibromsalicylic Ac.-(1), **4**.1840
3,5- — Ald., **4**.790
α,β-Dibromstearic Ac., **4**.680
α,α′-Dibromsuberic — ., **4**.1614
s-Dibromsuccinic — , (high-melting), **4**.1960
s- — — , (high-melting "Allo")., **4**.1530
2,5-Dibromterephthalic Ac., **4**.2060
3,6-Dibrom-1,2,4,5-tetraethylbenzene, **4**.115
5,6- — -1,2,3,4- — , **4**.750
3,5- — -1,2,4,5-tetramethylbenzene, **4**.1735
4,6- — -1,2,3,5- — , **4**.1730
5,6- — -1,2,3,4- — , **4**.1785
1′,2-Dibromtoluene, **4**.155
1′,4- — , **4**.530
2,3- — , **4**.160
2,5- — , **4**.4350
2,6- — , **4**.4370
3,4- — , **4**.4360
3,5- — , **4**.245
5,6- — -3-sulphonyl Chloride, **245**.195
2,5-Dibrom-p-toluic Ac., **4**.1727
2,6- — -p- — — ., **4**.1907
3,5- — -p- — — ., **4**.1667
3,5- — -2-toluidine, **51**.140
2,5- — -3- — , **51**.275
4,5- — -3- — , **51**.190
4,6- — -3- — , **51**.290
5,6- — -3- — , **51**.395
2,5- — -4- — , **51**.390
3,5- — -4- — , **51**.285
2,6-Dibrom-4-toluidine, **51**.435
4,6-Dibromtoluquinone-(2,5), **4**.1150
α- — -(2,5), **4**.800
2,4-Dibrom-1,3,5-trimethylbenzene, **4**.510
3,6- — -1,2,4- — , **4**.575
3,5- — -trinitrotoluene, **51**.1180
β,γ- — -valerianic Ac., **4**.605
γ,δ- — — — ., **4**.465
γ,γ- — — — ., **4**.390
1′,4′-Dibromxylene, **4**.1380
Di-n-butylsulphoxide, **7**.120
Dichlor-acetaldehyde, **3**.2395
— -acetale, **3**.3845
— -acetamide, **50**.700
Dichloracetanilide, **50**.910
2,3- — , **50**.1242
2,4- — , **50**.1175
2,5- — , **50**.1050
2,6- — , **50**.1395
3,4- — , **50**.960
3,5- — , **50**.1495
Dichlor-acetic Ac., **3**.2845
s- — -acetone, **3**.320
uns.-Dichloracetone, **3**.2505
Dichloracetonitrile, **50**.1827
1^2,4-Dichloracetophenone, **3**.1100
$1^2,1^2$- — , **3**.110
Dichloracet-p-toluide, **50**.1225
Dichloracetyl Chloride, **3**.2440
α,β-Dichloracrylic Ac., **3**.890
β,β- — — ., **3**.760
Dichloralizarine, **3**.2020
3,6-Dichlor-2-aminobenzaldehyde, **50**.500
2,6- — -4-aminophenol, **50**.1322
2,3-Dichloraniline, **50**.60
2,4- — , **50**.310
2,5- — , **50**.220
2,6- — , **50**.140
3,4- — , **50**.430
3,5- — , **50**.225
Dichloranthione, **3**.1425
1,2-Dichloranthracene, **3**.2155
(β)-9,10- — , **3**.2025
Dichloranthracene Dichloride, **3**.1550
— (α) Tetrachloride, **3**.1900
— (β) — , **3**.2010
1,2-(α)-Dichloranthraquinone, **3**.1675
1,5- — , **3**.2100
(β)- — , **3**.2005
2,2′-Dichlorazobenzene, **50**.1095
3,3′- — , **50**.755
4,4′- — , **50**.1455
2,2′-Dichlorazoxybenzene, **50**.255
3,3′- — , **50**.705
4,4′- — , **50**.1235
2,5-Dichlorbenzal Chloride, **3**.290
2,4-Dichlorbenzaldehyde, **3**.690
2,5- — , **3**.525
3,4- — , **3**.310
2,5- — -phenylhydrazone, **50**.820
2,5-Dichlorbenzamide, **50**.1240
3,4- — , **50**.1065
m-Dichlorbenzene, **3**.2760
o- — , **3**.2785
p- — , **3**.460
2,2′-Dichlorbenzidine, **50**.1315
3,3′- — , **50**.1060
2,3-Dichlorbenzoic Ac., **3**.1730
2,4- — — ., **3**.1635
2,5- — — ., **3**.1615
2,6- — — ., **3**.1395
3,4- — — ., **3**.1980
3,5- — — ., **3**.1860
4,4′-Dichlorbenzophenone, **3**.1530
2,3-Dichlorbenzoquinone, **3**.1040
2,5- — , **3**.1670
2,6- — , **3**.1300
$1',1^2$-Dichlorbenzylacetone, **3**.975
Dichlor-benzyl Chloride, **3**.3090
o- — -bibenzyl, **3**.635
p- — — , **3**.1225
p- — -biphenyl, **3**.1545
2,4-Dichlor-butadiene-(1,4), **3**.2610

1,4- — -butandiol-(2,3), **3**.1350
1,1- — -butane, **3**.3470
1,4- — — , **3**.3740
2,2- — — , **3**.2410
2,3- — — , **3**.3475
3,3- — -butanone-(2), **3**.2465
1,1- — -2-butylene, **3**.3540
α,β- — -butyric Ac., **3**.585, **3**.800
β,γ- — — — ., **3**.385
Dichlor-carbazole, **50**.1540
— -chrysene, **3**.2180
α,β-Dichlorcinnamic Ac., **3**.1302
1,1′-Dichlorcresol-(2), **3**.840
3,5- — -(2), **3**.492
Dichlor-m-cresol, **3**.345
1′,1′-Dichlorcymene, **3**.3110
Dichlor-n-decane (fr. Petroleum), **3**.4030
2,6-Dichlor-diaminobenzaldehyde, **50**.1550
3,6- — -dianilinobenzoquinone, **50**.1730
3,3′- — -diazoaminobenzene, **50**.830
4,4′- — — , **50**.1005
4,4′- — -dibenzil, **3**.1975
β,β- — -diethyl Sulphide, **70**.580
2,4-Dichlor-1,3-dimethylbenzene, **3**.3020
4,5- — -1,2- — (solid modif.), **3**.725
4,5- — -1,2- — (liq. modif.), **3**.3045
2,3- — -2,3-dimethylbutane, **3**.1647
2,5- — -2,5-dimethylhexane, **3**.610
α,α′- — -α,α′-dimethylsuccinic Ac., **3**.1887
2,5- — -1,3-dinitrobenzene, **50**.805
3,6- — -1,4 (or 2)- — , **50**.765
4,6- — -1,3-dinitrobenzene, **50**.785
1,2-Dichlor-dinitronaphthalene, **50**.1347
1,3- — — , **50**.1216
1,3- — — , **50**.1262
1,4- — — , **50**.1263
2,6- — — , **50**.1694
2,7- — — , **50**.1692
2,3- — -4,6-dinitrotoluene, **50**.970
3,6- — -2,5-dioxybenzoquinone, **3**.2187
Dichlordiphenyl-amine, **50**.505
— dichlorethylene, **3**.920
Dichlordiphenylethylene, **3**.820
m- — -thiourea, **158**.150
o- — — , **158**.195
p- — — , **158**.225
Dichlorditolylmethane, **3**.1175
2,2-Dichlor-ethanal-(1), **3**.2395
1,1- — -ethane, **3**.2320
1,2- — — , **3**.2365
2,2- — -ethanol-(1), **3**.3670
"Dichlorether," **3**.2585
α,α- — , **3**.3495
1′,1^2-Dichlor-ethylbenzene, **3**.3065
s- — -ethylene, **3**.2315
uns- — — , **3**.2305
Dichlor-fluorenone, **3**.1915
1,1- — -heptane, **3**.3885
4,4- — — , **3**.3835
1,2-Dichlorhexane, **3**.3795
1,6- — , **3**.3970
2,3- — , **3**.3755
2,5- — , **3**.3815
5,5-Dichlorhexene-(1), **3**.2650
3,3′-Dichlorhydrazobenzene, **50**.665
4,4′- — , **50**.985
α-Dichlorhydrine, **3**.2770
2,3-Dichlorhydroquinone, **3**.1510
2,5- — , **3**.1735
2,6- — , **3**.1715
3,5-Dichlor-4-hydroxybenzoic Ac., **3**.2165
s-Dichlor-β-hydroxyisobutyric Ac., **3**.965
uns.- — -β- — — ., **3**.835
2,3-Dichlorindole, **50**.795
Dichlorisatine, **50**.1480
α,β-Dichloriso-butyric Ald., **3**.2520
s- — -propyl Nitrate, **50**.1895
4,6- — -phthalic Ac., **3**.2185
Dichlor-lactic Ac., **3**.755
— -levulinic Ac., **3**.775
— -maleic Ac., **3**.1294
— — — Dichloride, **3**.1954
(solid)-Dichlormaleic Ac., tetrachloride, **3**.265
Dichlor-methane, **3**.2310
s- — -methylal, **3**.2735
2,4-Dichlor-1-methylbenzene, **3**.2850
2,6-Dichlor-1-methylbenzene, **3**.2895
3,4- — -1- — , **3**.2920
3,5- — -1- — , **3**.135
4-Dichlormethylbenzene, **3**.160
2,4-Dichlor-2-methylbutane, **3**.3705
s-Dichlormethyl Ether, **3**.2430
Dichlormethylformamidine, **50**.1440
1,2-Dichlor-2-methyl-propane, **3**.2455
1,1- — -2- — -propene-(1), **3**.2450
1,3- — -2- — — -(1), **3**.2550
1,2 (?)- — -napthalene, **3**.200
1,4-Dichlor-napthalene, **3**.660
1,5 (γ) — — , **3**.1180
1,6- — — , **3**.380
1,7- — — , **3**.580
1,8- — — , **3**.865
2,3- — — , **3**.1310
2,6- — — , **3**.1445
2,7-(8) — — , **3**.1250
1,2-Dichlornaphthalene-5-sulphonamide, **158**.320
1,2- — -6- — , **158**.270
1,2- — -7- — , **158**.330
1,2- — -8- — , **158**.315
1,3- — -5- — , **158**.350
1,4- — -6- — , **158**.340
1,5- — -2- — , **158**.355
1,6- — -4- — , **158**.305
1,2- — -5-sulphonyl Chloride, **70**.235
1,2- — -6- — — , **70**.435
1,2- — -7- — — , **70**.300
1,2- — -8- — — , **70**.360
1,3- — -5- — — , **70**.370
1,4- — -6- — — , **70**.345
1,5- — -2- — — , **70**.305
1,6- — -4- — — , **70**.385
1,8- — -3- — — , **70**.410
1,8- — -4- — — , **70**.275
2,7- — -3- — — , **70**.430
5,8-Dichlor-α-napthoic Ac., **3**.1895
5,8- — -β- — — , **3**.2192
1,3-Dichlor-naphthol-(2), **3**.810
1,4- — — -(2), **3**.1325
2,4- — — -(1), **3**.1165
6,8- — — -(2), **3**.1345
Dichlor-α-naphthoquinone, **3**.1535
— -α- — Chloride, **3**.1145
β- — -α- — , **3**.1590
2,3- — naphthoquinone-(1,4), **3**.1950
3,4- — -β- — -(1,2), **3**.1880
5,8-(p)-Dichlor-α-naphthoquinone, **3**.1795
7,8-Dichlor-α- — , **3**.1855
Dichlor-α-naphthoquinone Chloride, **3**.1265
2,4-Dichlor-α-naphthylamine, **50**.520
4,7- — -α- — , **50**675
5,7- — -α- — , **50**.915
5,8- — -α- — , **50**.810
4,5- — -2-nitraniline, **50**.1415
2,5- — -4- — , **50**.1220
2,6- — -4- — , **50**.1515
2,5- — -6- — , **50**.380

3,5- — -4- — , **50**.1350
4,6- — -2- — , **50**.735
5,6- — -2- — , **50**.1295
2,5- — -3 (or 4)-nitrobenzaldehyde, **50**.390
3,6- — -2- — , **50**.1110
2,4- — -nitrobenzene, **50**.100
2,5- — — , **50**.240
3,4- — — , **50**.160
(s)-3,5-Dichlornitrobenzene, **50**.350
3,6-Dichlor-2-nitrobenzoic Ac., **50**.1170
1,4- — -5-nitronaphthalene, **50**.647
1,5- — — , **50**.1693
1,7- — — , **50**.1122
1,5- — -4- — , **50**.1167
1,6- — -4- — , **50**.942
2,5- — -4-nitrophenol, **50**.885
2,6- — -4- — , **50**.1015
4,6- — -2- — , **50**.965
1′-1′- — -3-nitrotoluene, **50**.345
1′,1′- — -4- — , **50**.185
2,3- — -5- — , **50**.540
1,9-Dichlor-nonane, **3**.4045
Dichlor-nononaphthylene, **3**.4025
1,8-Dichloroctane, **3**.4035
2,2- — , **3**.3920
5,7-Dichlor-8-oxyquinoline, **50**.1430
2,3-Dichlorpentane, **3**.3615
1,5- — , **3**.3825
3,4-Dichlorpentene-(2), **3**.2605
Dichlorpentene fr. Hexylchloral, **3**.2640
Dichlor-phenanthrene Tetrachloride, **3**.1515
— -phenanthrone, **3**.1725
2,4-Dichlor-phenol, **3**.300
2,5- — — , **3**.125
2,6- — — , **3**.620
2,4-Dichlorphenyl Benzoate, **3**.1065
2,5-Dichlorphenylenediamine, **50**.1340
2,6-Dichlor-p-phenylenediamine, **50**.990
2,4-Dichlorphenyl Methyl Ether, **3**.140
3,6-Dichlor-o-phthalic Ac., **3**.1940
4,5- — — — — , **3**.1875
3,6- — -phthalid, **3**.1710
1,1- — -propane, **3**.3340
1,3- — — , **3**.2510
2,2- — — , **3**.2330
1,3- — -propanol-(2), **3**.2770
1,1- — -propene-(1), **3**.2355
1,2- — — -(1), **3**.2340
1,3- — — , **3**.2445
2,3- — — -(1), **3**.2405
3,3- — — -(1), **3**.2375
α,α-Dichlor-propionamide, **50**.920
α,α- — -propionic Ac., **3**.2820
α,β- — — — , **3**.405
β,β- — — — , **3**.500
α,α- — -propionitrile, **50**.1817
α,α — -propionyl Chloride, **3**.2435
Dichlorpyridine, **50**.365
2,6-Dichlorpyridine, **50**.585
Py-2,3-Dichlorquinoline, **50**.815
3,5- — -salicylic Ald., **3**.1785
3,5- — — Chloride, **3**.805
oo-Dichlorstilbene, **3**.1050
oo- — Dichloride, **3**.1760
1′,1′-Dichlorstyrene, **3**.3015
$1^2,1^2$- — , **3**.3040
(Allo)-Dichlorsuccinic Ac., **3**.1805
(high melting)-α,α′-Dichlorsuccinic Ac., **3**.2055
o-Dichlor-sulphobenzid, **70**.440
p- — — , **70**.380
2,5- — terephthalic Ac., **3**.2194
Dichlor-thiophene, **70**.570
oo- — -tolane, **3**.910
α-o- — — Dichloride, **3**.1790
β-o- — — — , **3**.1385
1′,1′- — -toluene, **3**.2925
2,3- — — , **3**.2900
2,5- — — , **3**.60
Dichlortoluene Hexachloride, **3**.1560
2,5-Dichlor-p-toluic Ac., **3**.1898
2,6- — — — — , **3**.1897
3,5- — — -toluidine, **50**.295
4,6- — -m- — , **50**.555
5,6- — — — , **50**.590
1′,3′- — -1,3,5-trimethylbenzene, **3**.275
2,4- — -1,3,5- — , **3**.535
1,1- — -trimethylene, **3**.2345
1,3- — -trinitronaphthalene, **50**.1422
2,6-Dichlor-trinitronaphthalene, **50**.1532
2,7- — — , **50**.1536
2,2- — -undecane, **3**.4047
Diethylacetyl Chloride, **3**.3590
Diethyl-aminoacetone Chloroplatinate, **169** 110
— -anilinesulphonic Ac., **54**.1900
— -benzenesulphonamide, **54**.580
o- — — , **54**.835
— -bromacetamide, **51**.235
— -bromacetic Ac., **4**.105
— - carbamyl Chloride, **50**.1897
— Chlorfumarate, **3**.3107
— Chlormalonate, **3**.3025
— Dibrommalonate, **4**.4375
— -s-Dibromsuccinate, **4**.560
— Dicarbothionate, **7**.1650
— Dichlormalonic Ac., **3**.3055
s- — -diphenylthiourea, **54**.315
Diethyl Disulphoxide, **7**.1505
— Dithiolcarbonate, **7**.1745
Diethylene Disulphide, **7**.705
(polym.) — — , **7**.960
a-Diethyl-ethylenediamine Chloroplatinate, **169**.560
s- — — — , **169**.485
— -malonyl Chloride, **3**.2875
— -sulphamyl — , **158**.410
— Sulphate, **7**.1800
— Sulphite, **7**.1590
— -sulphone, **7**.330
— Thiocarbonate, **7**.1595
— -thiophene, **7**.1655
s- — -thiourea, **54**.325
— Trithiocarbonate, **7**.1885
Di-n-heptyl Sulphide, **7**.1935
Di-n- — -sulphone, **7**.445
Dihydronaphthalene Dibromide, **4**.700
5,6-Dihydroxy-2-chlornaphthoquinone-(1,4), **3**.1815
Dihydroxydiphenyl Disulphide, **7**.1012
5,6-Dihydroxy-1,4-naphthoquinone Dichloride, **3**.2080
Dihydroxyphenylthiourea, **54**.1750
p-Dihydroxythiobenzene, **7**.1010
Diiod-acetic Ac., **5**.400
— — Anhydr., **5**.180
s- — -acetone, **5**.220
— -acetylene, **5**.300
α,β-Diiodacrylic Ac., **5**.365
β,β- — — ., **5**.450
2,4-Diiod-aniline, **52**.130
3,3′- — -azobenzene, **52**.200
4,4′- — — , **52**.310
m- — -benzene, **5**.135
o- — — , **5**.85
p- , **5**.445
2,2′- — -benzophenone, **5**.370
4,4′- — — , **5**.645

2,5-Diiodbenzoquinone-(1,4), **5**.495
2,6- — -(1,4), **5**.535
4,4′-Diiod-biphenyl, **5**.575
1,4- — -butadiine-(1,3), **5**.350
1,4- — -butane, **5**.55
2,3- — -butene-(2), **5**.150
Diiodcarbazole, **52**.252
$1',1^2$-Diiodcinnamic Ac., **5**.517
Diiodcresol-(2), **5**.235
4,6-Diod-1,3-dimethylbenzene, **5**.715
Di-ioddiphenylamine, **52**.180
1,1-Diiodethane, **5**.925
1,2- — , **5**.310
("trans")-1,2-Diiodethene, **5**.260
(liq. modif.)-1,2-Diiodethylene, **5**.955
1,6-Diiodhexane, **5**.60
2,5- — (solid modif.), **5**.160
3,5-Diiod-4-hydroxybenzaldehyde, **5**.570
Diiod-malonic Ac., **5**.425
s- — -methyl Eth., **5**.1005
1,2- — -naphthalene, **5**.305
1,4- — — , **5**.390
1,2- — -nitrobenzene, **52**.155
2,4- — — , **52**.230
2,6- — -4-nitrophenol, **52**.220
6,7- — -octene, **5**.480
1,5- — -pentane, **5**.65
2,4- — — , **5**.940
2,4- — -phenol, **5**.255
1,3- — -propane, **5**.1025
2,2- — — , **5**.875
2,3- — -propanol-(1), **5**.165
1,2- — -propene, **5**.970
3,5- — -salicylic Ac.-(1), **5**.625
$1',1^2$- — -styrene, **5**.275
2,4- — -toluene, **5**.1055
2,4- — -1,3,5-trimethylbenzene, **5**.320
1,2- — -xylene, **5**.385
1′,4′- — — , **5**.515
Diiso-amylsulphoxide, **7**.150
— -amylthiourea, **54**.287
— -butylsulphone, **7**.55
— -butylsulphoxide, **7**.315
s- — -propylthiourea, **54**.1280
Dimesitylthiourea, **54**.1645
Dimethylamine Chloroplatinate, **169**.340
— Hydrochloride, **50**.1355
Dimethylamino-acetone Chloroplatinate, **169**.105
— -diphenylsulphone, **54**.375
Dimethyl-p-aminothiophenol, **54**.65
— -anilinesulphonic Ac., **54**.1880
1,3-Dimethylbenzene-2,4-disulphonamide, **54**.1855
1,3- — -2,4-disulphonyl Chloride, **70**.320
1,3- — -4,6- — — , **70**.340
1,2- — -4-sulphinic Ac., **7**.465
1,3- — -4- — ., **7**.425
1,2- — -4-sulphonamide, **54**.1090
1,3- — -2- — , **54**.480
1,3- — -4- — , **54**.1030
1,4- — -2-sulphonic Ac., **7**.205
1,2- — -4-sulphonyl Chloride, **70**.80
1,4- — -2- — — , **70**.60
1,3-Dimenthylbenzoyl-(4) Chloride, **3**.130
Dimethyl-carbamyl Chloride, **50**.1872
— -chloramine, **50**.1800
1,1-Dimethyl-2-chlorbutane, **3**.3465
2,3- — -1- — , **3**.3515
2,3 — -2- — , **3**.3460
Dimethyl s-Dibromsuccinate, **4**.555
2,2-Dimethyl-3,3-dichlorbutane, **3**.1575
2,3- — -2,3- — , **3**.1665
Dimethyl Dithiolcarbonate, **7**.1616
— -ethylacetyl Chloride, **3**.3565
— -hydroxylamine Chloroplatinate, **169**.145
— Methionate, **7**.200
a,a-Dimethylphenylthiourea, **54**.1010
a.b- — , **54**.775
3,4-Dimethylpiperidine Chloroaurate, **161**.140
2,6-Dimethylpiperidine Chloroplatinate, **169**.405
3,5-Dimethylpyridine Chloroaurate, **161**.125
2,6-Dimethylpyridine Chloroplatinate, **169**.365
3,4- — — , **169**,320
3,5- — — , **169**.640
1,2-Dimethylpyrrolidine — , **169**.480
2,3-Dimethylquinoline — , **169**.555
2,4- — — , **169**.550
3,4- — Chloroaurate, **161**.195
4,6- — Chloroplatinate, **169**.565
4,8- — — , **169**.460
4,8- — Chloroaurate, **161**.205
s-Dimethylsulphamide, **54**.330
Dimethyl-sulphaminic Ac., **54**.1330
— -sulphamyl Chloride, **158**.400
— Sulphate, **7**.1710
— Sulphite, **7**.1485
1,4- — -2-sulphonamide, **54**.1110
Dimethylsulphone, **7**.685
2,3-Dimethylthiophene, **7**.1515
2,4- — , **7**.1525
2,5- — , **7**.1520
3,4- — , **7**.1545
2,5- — -3-carbonic Ac., **7**.740
1,4-Dimethylthiophenol-(2), **7**.1785
uns.-Dimethylthiourea, **54**.365
s.- — , **54**.225
2,4-Dimethyltoluene, **3**.2850
Dimethyl Trithiocarbonate, **7**.1775
Di-β-naphthylcarbamyl Chloride, **50**.1370
Di-β,β-naphthyl Sulphide, **7**.1015
α-Dinaphthylsulphone, **7**.1165
Di-α,β-naphthylsulphone, **7**.785
Di-β,β- — , **7**.1115
α-Dinaphthylsulphoxide, **7**.1070
s.-Di-α-naphthylthiourea, **50**.1690
s.-β-Di — , **50**.1670
1,3-Dinitrobenzene-4-sulphonamide, **54**.1200
1,3- — -4-sulphonic Ac., **54**.650
2,6-Dinitrobenzoate Esters, Use of in Confirmatory Tests, (T. **4**.7), p. 11
2,6-Dinitrobenzoyl Chloride, **50**.715
2,6-Dinitro-1,3-dimethyl-4-sulphonyl Chloride, **158**.145
m-Dinitrodiphenyl Disulphide, **54**.385
o- — — , **54**.1610
m- — -thiourea, **54**.1275
1,8-Dinitronaphthalene-3,6-disulphonyl Chloride, **158**.310
1,8- — -3-sulphonyl Chloride, **158**.190
Dinitrosulphobenzid, **54**.1650
1,3-Dinitro-4-sulphonyl Chloride, **158**.130
α-Dinitrothiophene, **54**.135
β- — , **54**.310
2,4-Dinitrothiophenol, **54**.980
2,6(?)Dinitrotoluene-4-sulphonamide, **54**.1685
2,6(?) — -4-sulphonic Ac., **54**.1335
2,6(?)- — -4-sulphonyl Chloride, **158**.155
Diogenal, **51**.750
Diphenyl-amine+Picryl-chloride Comp., **50**.355
— -brommethane, **4**.330
— -bromethylene, **4**.255
— -chlorethylene, **3**.291
— -chlormethane, **3**.80
— -dichlormethane (Benzophenone Chloride), **3**.3165
— -4,4′-disulphonic Ac., **7**.360
— -4,4′disulphonyl Chloride, **70**.480

Diphenylene Disulphide, **7**.1040
— -disulphone, **7**.1290
Diphenyl-methanedisulphonic Ac., **7**.280
— -methylenethylene Disulphide, **7**.655
— -o-phenylenedithiourea, **54**.1960
2,6-Diphenylpyridine, Chloroplatinate, **169**.310
Diphenyl-sulphonamide, **54**.1785
— -sulphone, **7**.790
5- — — , **7**.850
— — -methane, **7**.760
— -sulphoxide, **7**.335
— -thiocarbazide, **54**.1155
— -thiocarbazinic Ac., **54**.695
— Thiocarbonate, **7**.660
— -thiohydantoin, **54**.1445
2,4-Diphenylthiophene, **7**.750
2,5- — , **7**.1025
5-Diphenylthiourea, **54**.1180
p- — , **54**.1780
"Diphosgene," **3**.2535
Dipropargyl Octabromide, **4**.1350
Dipropyl Sulphite, **7**.1720
— -sulphone, **7**.100
s- — -thiourea, **54**.90
s- — — , **54**.265
3,5-Disulphobenzoyl Trichloride, **70**.165
2,4-Disulphoisophthalic Ac., **7**.1250
Disulphosalicylic Ac., **7**.965
2,2′-Dithienyl, **7**.125
2,2′- — -ketone, **7**.510
Dithienylphenylmethane, **7**.380
Dithio-acetale, **7**.1695
— -acetanilide, **54**.1712
— -acetole, **7**.1690
— -acetone, **7**.1675
— -carbamates, Decomposition of by Sulphuric Acid (T.**4**.9), p. 13
— -diethylaniline, **54**.285
— -di-glycollic Ac., **7**.600
(α-modif.) α-Dithiodilactylic Ac., **7**.940
β- — — ., **7**.1035
Dithio-dimethylaniline, **54**.820
N- — -dipiperidine, **54**.235
— -diphenylamine, **54**.200
— -hydroquinone, **7**.590
Dithionyl-p-phenylenediamine, **54**.800
Dithio-salicylic Ac., **7**.1275
— -xanthone, **7**.1200
uns-Dithiourea, **54**.1255
Ditolane Hexachloride, **3**.1565
p-tolubenzylthiourea, **54**.860
Di-p-toluenesulphonyl Sulphide, **7**.890
Di-p-tolyl-sulphone, **7**.1060
Di-p- — -sulphoxide, **7**.555
Di-o- — -thiourea, **54**.1245
Di-p- — — , **54**.1440
a,b-Di-m-tolylthiourea, **54**.725
Di-o-xylylthiourea, **54**.1560
Dodecylene Bromide, **4**.50
Dulcitemonochlorhydrin, **3**.950
Dulcitoldibromhydrine, **4**.1375
Duplodithioacetone, **7**.595
Duplothioacetone, **7**.1675

E

d,Ψ-Ecgonine Chloroaurate, **161**.305
l- — Chloroplatinate, **169**.525
rac.- — Chloroaurate, **161**.285
Elaidic Ac. Dibromide, **4**.140
Ephedrine Chloroplatinate, **169**.180
Epichlorhydrine, **3**.2405
α- — , **3**.2490
β- — , **3**.2445
Erucic Ac. Dibromide, **4**.280
— — Dichloride, **3**.365
Erythrine Hexabromide, **4**.1585
Erythrite Dichlorhydrine, **3**.1350
Esters of Isothiocyanic Acid (Mustard Oils) (T. **4**.14), p. 17
Ethanedisulphonic-(1,2) Ac., **7**.630
— -dithiol-(1,2), **7**.1550
— -dithioldiethylether, **7**.1810
— -sulphon-amide, **54**.175
— — -diethylamide, **54**.2265
— — -ethylamide, **54**.2250
— — -methylamide, **54**.2290
Ethenyl-amino-thiocumenol, **54**.227
— — -thiocresol, **54**.2280
— — -thionaphthol, **54**.475
— — -thiophenol, **54**.2245
Ethionic Ac., **7**.440
Ethoxalyl Chloride, **3**.2565
Ethyl-allylamine Chloroplatinate, **169**.75
— Allylthiocarbamate, **54**.2213
— ammonium Ethyldithiocarbamate, **54**.592
— — Hydrochloride, **50**.465
— aniline Hydrochloride, **50**.1400
— Anilinothiocarbonate, **54**.275
— Anthraquinonesulphonate-(2), **7**.815
— Azobenzenexanthate, **50**.240
m- — -benzenesulphonamide, **54**.405
o- — — , **54**.5450
p- — — , **54**.690
— benzenesulphone, **7**.620
μ- — -benzothiazole, **54**.2260
— Bromacetate, **4**.4725
— d,l-α-Brombutyrate, **4**.4735
— Bromide, **4**.4500
— α-Bromisobutyrate, **4**.4710
— α-Brompropionate, **4**.4695
— -carbamyl Chloride, **50**.1815
— Chloracetate, **3**.2600
— α-Chloracetoacetate, **3**.3900
2- — -2-chlorbutane, **3**.3455
— d,l,β-Chlorbutyrate, **3**.3775
— Chlorcyanoacetate, **50**.1900
3- — -3-chlorhexane, **3**.3710
— Chloride, **3**.3210
— α-Chlorisocrotonate, **3**.3855
— Chloroformate, (Chlorocarbonate), **3**.3372
— Chlorosulphonate, **70**.560
— α-Chlorpropionate, **3**.3660
— Dibromacetate, **4**.4240
— Dichloracetate, **3**.2700
— α-α-Dichloracetoacetate, **3**.2935
— -dichloramine, **50**.1810
— -a,b-diphenylthiourea, **54**.435
— Disulphide, **7**.1570
— Dithioallophanate, **54**.1395
Ethylene Bromide, **4**.4015
— Chlorhydrine, **3**.2555
— Chloride, **3**.2365
— -dimercaptan, **7**.1550
— -diphenyldisulphone, **7**.1120
— -diphenyldithiourea, **54**.1615
— Iodide, **5**.310
— Thiocyanate, **54**.440
— -thiourea, **54**.1625
Ethyl Ethanesulphonate, **7**.1820
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1,2,2,3- — , **4**.70
1,2,2,3- — , **4**.4320
α,β,β,β-Tetrabrompropionic Ac., **4**.1205
α,α,β,β- — — , **4**.1245
Tetrabrom-pyrocatechol, **4**.1686
— -o-quinone, **4**.1415
α-Tetrabromquinoline, **51**.705
β- — , **51**.1125
2,3,5,6-Tetrabromterephthalic Ac., **4**.2046
2,3,4,5-Tetrabromtoluene, **4**.1090
2,3,4,6- — , **4**.1025
2,3,5,6- — , **4**.1175
Tetrabrom-4-toluidine, **51**.1170
α,β,γ,δ-Tetrabromvalerianic Ac., **4**.1480
Tetrabrom-o-xylene, **4**.1985
1′,1′,4′,4′-Tetrabromxylene, **4**.1575
2,3,4,6-Tetrachloracetanilide, **50**.1390
s-Tetrachloracetic Anhydr., **3**.2995
1,1,3,3-Tetrachloracetone, **3**.2800
1,3,3,3- — , **3**.2795
$1^2,1^2,1^2$,4-Tetrachloracetophenone, **3**.150
2,3,4,5-Tetrachloraniline, **50**.940
2,3,4,6- — , **50**.595
2,3,5,6- — , **50**.625
(α)-Tetrachloranthracene, **3**.2075
(β)- — , **3**.1585
1,2,3,4- — , **3**.1540
Tetrachloranthraquinone, **3**.2205
(α)- — , **3**.1935
2,4,2′,4′-Tetrachlorazobenzene, **50**.1285
2,5,2′,5′- — , **50**.1160
3,5,3′5′-Tetrachlorazoxybenzene, **50**.1360
1,2,3,4-(v)Tetrachlorbenzene, **3**.335
1,2,3,5-(α)- — , **3**.425
1,2,4,5-(s.)- — , **3**.1460
2,3,4,5-Tetrachlorbenzoic Ac., **3**.1890
2,5,2′,5′-Tetrachlorbenzophenone, **3**.1360
Tetrachlorbenzoquinone, **3**.2190
Tetrachlor-benzotrichloride, **3**.1140
— -benzyl Chloride, **3**.3155
— -benzylidene — , **3**.3170
1,2,3,4-Tetrachlorbutane, **3**.715
Tetrachlor-butene, **3**.2905
1,2,3,4- — — , **3**.2905
— -cyclohexenone, **3**.1320
2,4,2,4- — -diazoaminobenzene, **50**.1020
(α)-Tetrachlor-1,2-dihydronaphthenone-(1), **3**.1145
(β)- — -1,2- — -(1), **3**.1265
1,1,3,4-Tetrachlor-1,2- — -(2), **3**.1045
2,3,7,8- — -5,6-dihydroxynaphthoquinone-(1,4), **3**.2115
2,4,5,6- — -1,3-dimethylbenzene, **3**.2035
s-Tetrachlorethane,**3**.2635
1,1,1,2- — , **3**.2545
1,2,2,2-Tetrachlorether, **3**.2825
Tetrachlor-hydroquinone, **3**.2105
— -isophthalic Ac., **3**.2181
Tetrachlor-methane, **3**.2360
— -methyldiphenylamine, **50**.690
— -naphthazarine, **3**.2115
— -α-naphthoquinone, **3**.1650
1,2,3,5-Tetrachlornitrobenzene, **50**.55
1,2,4,5- — , **50**.730
2,3,4,5-Tetrachlor-1-nitrobenzene, **50**.340
δ-Tetrachlor-nitronaphthalene, **50**.1232
— -phenanthrene, **3**.1765
2,3,4,6-Tetrachlor-phenol, **3**.625
2,3,4,6- — -phenyl Benzoate, **3**.1240
Tetrachlorphthalic Ac., **3**.2140
— Anhyd., **3**.2145
Tetrachlor-phthalyl Tetrachloride, **3**.1485
— -p-phenylenediamine, **50**.1615

— -propane, **3**.1830
1,1,1,2-Tetrachlorpropane, **3**.2665
1,1,2,2- — , **3**.2670
1,1,2,3- — , **3**.2790
1,2,2,3- — , **3**.2720
Tetrachlorpropene, **3**.2730
Tetrachlorpyrrole, **50**.845
2,3,4,5-Tetrachlorpyridine, **50**.49
2,3,4,6- — , **50**.458
2,3,5,6- — , **50**.630
Tetrachlor-pyrocatechol, **3**.1957
— -o-quinone, **3**.1365
2,3,5,6-Tetrachlor-terephthalic Ac., **3**.2186
1,1,3,4- — 1,2,3,4-tetrahydronaphthenone-(2), **3**.1105
Tetrachlorthiophene, **70**.65
— Tetrachloride, **70**.485
Tetrachlortoluene, **3**.1020
1′,1′,1′,2- — , **3**.170
1′,1′,3,4- — , **3**.3115
3,1′,1′,1′- — , **3**.3105
4,1′,1′,1′- — , **3**.3100
1′,1′,2′,2′-Tetrachlorxylene, **3**.940
1′,1′,3′,3′- — , **3**.3135
1′,1′,4′,4′- — , **3**.990
3,4,5,6-Tetrachlor-o-xylene, **3**.2060
Tetrachlor-p-xylene, **3**.2070
Tetradecylene Bromide, **4**.60
1,2,3,4-Tetraethylbenzenesulphonamide, **54**.625
1,2,4,5- — , **54**.855
Tetraethyl-thiourea, **54**.2215
— -thiuram Disulphide, **54**.260
Tetrahydro-isoquinoline Chloroplatinate, **169**.570
— -quinoline — , **169**.275
— — Hydrochloride, **50**.1437
— -α-thiophenecarbonic Ac., **7**.230
s-Tetraiodacetone, **5**.470
2,4,5,6-Tetraiod-1,3-dimethylbenzene, **5**.440
Tetraiod-ethane, **5**.960
— -ethene, **5**.560
— -methane, **5**.340
— -phenolphthaleine, **5**.622
— -phthalic Ac., **5**.665
— -pyrrole, **52**.195
2,3,5,6- — -terephthalic Ac., **5**.1062
Tetrakis-(iodomethyl)-methane, **5**.630
1,2,3,4-Tetramethyl-benzene-5-sulphonamide, **54**.1455
1,2,4,5- — — -3- — , **54**.1225
1,2,4,5- — — -sulphonyl Chloride, **70**.220
Tetramethyldiamino-diphenylmethanesulphone, **54**.1720
— -diphenylthiourea, **54**.1565
— -phenyl Disulphide, **54**.820
— -thiobenzophenone, **54**.1682
— -triphenylmethane Iodomethylate, **52**.295
Tetramethylethylenedibromide, **4**.1707
2,3,4,5-Tetramethyl-pyridine Chloroaurate, **161**.295
2,3,4,5- — — Chloroplatinate, **169**.385
Tetramethylthio-aniline, **54**.885
— -phene, **7**.1665
2,4-Tetranitro-phenyl Disulphide, **54**.1935
2,4- — — Sulphide, **54**.1605
Tetraphenyl-thiophene, **7**.1150
— -thiourea, **54**.1630
Tetra-sulphideacetic Ac., **7**.715
— -thiopenton, **7**.1100
Tetrolic Ac. Diiodide, **5**.435
Tetronal, **7**.495
Thiacet-α-naphthalide, **54**.705
— -β- — , **54**.1095
Thialdin. **54**.105
Thiazole, **54**.2110
Thienyl-acetic Ac., **7**.400
β-Thienyl Alc. **7**.1790
— Disulphide, **7**.250
α- — -glyoxylic Ac., **7**.545
— Mercaptan, **7**.1610
Thioacetacetic-ester, **7**.395
Thioacetamide, **54**.660
Thioacetanilide, **54**.305
Thioacetic Ac., **7**.1420
Thio-acet-p-toluide, **54**.920
— -aniline, **54**.630
— -benzamide, **54**.795
— -benzanilide, **54**.545
(polym.) Thiobenzophenone, **7**.975
— -o-benzotoluide, **54**.400
— -p- — , **54**.950
— -biazdithiol, **54**.1352
— -butyric Ac., **7**.1495
— -carbamido-phenol, **54**.1620
o- — — -thiophenol, **54**.1425
— -carbamino-β-naphthol, **54**.1345
2- — — -1-thionaphthol, **54**.1800
— carbanil, **54**.2225
— carbanilide, **54**.1180
— carvacrol, **7**.1875
— -2-cresol, **7**.1725
— -3- — , **7**.1730
— -4- — , **7**.180
m s-Thioacridol (or Thioacridone), **54**.1915
(polym.)- Thiobenzaldehyde, **7**.490
Thio-diethyl-aniline, **54**.355
— -diglycollic Ac., **7**.865
α- — -dilactylic — ., **7**.820
— -dimethylaniline, **54**.885
α- — -β- — , **54**.1810
β- — -β-Dinaphthylamine, **54**.1940
— -diphenylamine, **54**.1485
— -formamide, **54**.60
— -formanilide, **54**.1040
— -formyl-o-toluide, **54**.485
— - — , **54**.1400
— -hydantoin, **7**.1177
(liq.)-Thio-isovalerianic Ald., **7**.1455
(solid)- — — — ., **7**.320
Thiolbenzoic Ac., **7**.70
3- — — ., **7**.970
Thiomesital, **7**.1860
Thio-metaformic Aldehyde, **7**.1110
— -naphthene, **7**.110
— — -quinone, **7**.765
α- — -naphthol, **7**.1925
β- — — , **7**.767
Thionessal, **7**.1150
p-Thionyl-aminodimethylaniline, **54**.280
— -aniline, **54**.2205
— Cyanide, **54**.255
— -dimethylaniline, **54**.1215
— -ethylamine, **54**.2105
— -methylamine, **54**.2100
— -m-toluidine, **54**.2220
— -α-naphthylamine, **54**.70
— -β- — , **54**.145
— -piperidine, **54**.120
Thio-oxamindiphenylamidine, **54**.1305
— -palmitic Ac., **7**.332
— -paraformaldehyde, **7**.1215
Thio-phene, **7**.1395
α- — — -carbonamide, **54**.1410
α- — — -carbonic Ac., **7**.835
3-β- — — — — ., **7**.915
2,3- — — -dicarbonic Ac., **7**.1265
2,4- — — — — ., **7**.1270

2,5-o,o- — — — — ., **7**.1285
α-Thiophenesulphonamide, **54**.1070
β- — , **54**.1115
α-Thiophenic Ald., **7**.1760
Thiophenol, **7**.1620
— Acetate, **7**.1865
Thiophenylhydrazine, **54**.635
Thiophosgene, **70**.540
Thiophten, **7**.1850
Thio-picric Acid, **54**.770
N- — -piperidine, **54**.300
"Thio-pyrine," **54**.1340
— -pyrocatechol (Phenolthiol,) **7**.1835
— -quinanthrene **54**.1985
Py-2-Thioquinoline, **54**.1405
Thio-resorcinol, **7**.85
— -salicylic Ac., **7**.1075
— -semicarbazide, **54**.1507
Thiourea, **54**.1480
Thioxanthone, **7**.1180
Thiuram Disulphide, **54**.1185
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Tiglic Ac. Hydroidide, **5**.327
α-Tolane Dibromide, **4**.1745
β- — — , **4**.595
α- — Dichloride, **3**.1500
β- — — , **3**.595
Tolane Tetrachloride, **3**.1705
p-Tolenylamidine Chloroplatinate, **169**.515
o-Tolidine mustard Oil, **54**.1240
p-Tolueneazo-α-naphthylamine Hydrochloride, **50**.1305
Toluene-2,4-disulphonamide, **54**.1535
— 3,4- — , **54**.1815
— 2,5- — , **54**.1760
β- — 2,5-disulphonyl Chloride, **158**.100
Toluene-3,5-disulphonyl — , **70**.482
— 2,4- — — , **70**.95
— 3,4- — — , **70**.255
— 3,5- — — , **70**.482
o- — -sulphinic Ac., **7**.435
p- — — — , **7**.485
m- — -sulphonamide, **54**.67
o- — — , **54**.1195
p- — — , **54**.1020
p-Toluenesulphonic Ac., **7**.550
p- — -phenylhydrazide, **54**.1230
p- — -p-Toluide, **54**.815
p-Toluenesulphonyl-aminophenol, **54**.1065
p- — Chloride, **70**.135
N^4-p-Toluenesulphonyl-2,4-diaminotoluene, **54**.1270
Toluene-2,4,6-trisulphonyl Chloride, **70**.390
m-Toluidine Hydrochloride, **50**.1655
o- — — , **50**.1600
p- — — , **50**.1675
4- — -2-sulphonamide, **54**.1325
2- — -4- — , **54**.1415
p- — Tolyldithiocarbamate, **54**.155
o-Toluyl Chloride, **3**.2945
p- — — , **3**.3035
2,4-Toluylene-mustard Oil, **54**.160
2,4- — -thiourea, **54**.1135
p-Toluylsulphinid, **54**.1850
o-Tolyl Disulphide, **7**.160
p- — — , **7**.195
o- — Isothiocyanate, **54**.2245
p- — Mustard Oil, **54**.55
1-o-Tolyl-pyrazole Chloroplatinate, **169**.260
p- — Sulphide, **7**.265
o- — — , **7**.1920
o- — -sulphone, **7**.905
p- — Tetrasulphide, **7**.385
m- — -thiourea, **54**.720
p — — , **54**.1570
p- — p-Toluenethiosulphonate, **7**.405
Tribenzylamine Hydrochloride, **50**.1650
Tribrom-acenaphthene, **4**.875
— -acetamide, **51**.720
2,4,6-Tribromacetanilide, **51**.1190
Tribrom-acetic Ac., **4**.1300
1,1,1- — -acetone, **4**.1965
— -acetonitrile, **51**.975
1^2,1^2,4- — acetophenone, **4**.915
— -acetyl Bromide, **4**.4325
— -acrylic Ac., **4**.1185
2,4,6- — -3-aminobenzoic Ac., **51**.967
2,4,6-Tribrom-3-aminophenol, **51**.644
2,3,5- — -aniline, **51**.465
2,4,5- — — , **51**.375
2,4,6- — — , **51**.695
3,4,5- — — , **51**.690
— -anthracene, **4**.1567
2,4,6- — -benzamide, **51**.1035
1,2,3- — -benzene, **4**.835
1,2,4- — — , **4**.320
1,3,5- — — , **4**.1210
3,4,5- — — -1-sulphonamide, **173**.310
2,4,5-Tribrombenzene-1-sulphonyl Chloride, **245**.160
2,4,6- — -1- — — , **245**.120
3,4,5- — -1- — — , **245**.280
2,4,6- — -benzoic Ac., **4**.1700
3,4,5- — — — , **4**.1900
— -benzoquinone, **4**.1395
1,2,2- — -butane, **4**.4285
2,2,3- — — , **4**.4270
α,α,β- — -butyric Ac., **4**.1160
— -m-cresol, **4**.770
2,4,6-Tribrom-dinitrobenzene, **51**.1020
2,4,5- — -1,3-dinitro-benzene, **51**.805
2,4,6- — -dinitrophenol, **51**.1045
2,4,6- — — -toluene, **51**.1155
Tribrom-resorcinol, **4**.1075
1,1,2-Tribrom-ethane, **4**.4215
— -ethene, **4**.4135
Tribrom-flavorpurpurine, **4**.2030
— -guiacol, **4**.1167
— -glyoxalin, **51**.1140
— -hydroquinone, **4**.1325
2,4,6- — -3-hydroxybenzoic Ac., **4**.1390
— -isosafrol, **4**.1045
β,β,β- — -lactic Ac., **4**.1360
— -levulinic Ac., **4**.765
— -methyldiphenylamine, **51**.515
1,1,2- — -2-methylpropane, **4**.4275
1,2,4- — -naphthalene, **4**.1130
1,2,6- — — , **4**.1195
1,4,5-(β)- — -naphthalene, **4**.815
2,3,6- — -3-nitroaniline, **51**.787
3,4,5- — -2- — , **51**.773
4,5,6- — -2- — , **173**.190
2,3,5- — nitrobenzene, **51**.345
2,4,5- — — ,**51**.490
2,4,6- — — , **51**.740
3,4,5- — — , **51**.630
2,4,6-Tribrom-3-nitrophenol, **51**.455
2,4,6- — -3-nitrotoluene, **51**.1145
2,5,6- — -4- — , **51**.590
Tribromorcinol, **4**.965
2,4,6-Tribromphenol, **4**.930
— Bromide, **4**.1295
2,4,6-Tribrom-m-phenylenediamine, **51**.927
2,4,6- — phenylhydrazine, **51**.850
Tribrom-phloroglucinol, **4**.1430

— -phthalic Ac., **4**.1705
α,α,β-Tribrompropionic Ac., **4**.895
α,β,β- — — ., **4**.1180
2,2,3- — Ald., **4**.520
1,2,2-Tribrompropane, **4**.4235
1,2,3- — , **4**.4310
2,3,3-Tribrompropene-(1), **4**.4220
3,6,8-(γ)-Tribromquinoline, **51**.970
Tribrom-resorcinol, **4**.1075
— -succinic Ac., **4**.1320
2,3,4-Tribromtoluene, **4**.325
2,3,5- — , **4**.410
2,4,5- — , **4**.1095
2,4,6- — , **4**.625
2,5,6- — , **4**.480
3,4,5- — , **4**.845
2,3,5-tribrom-4-toluidine, **51**.360
2,3,6- — -4- — , **51**.685
2,4,6- — -3- — , **51**.545
Tribrom-toluquinone-(2,4), **4**.1890
— -1,2,4-trimethylbenzene, **4**.1860
1′,3,′5′-Tribromtrimethylbenzene, **4**.920
2,4,6-Tribrom-1,3,5-trimethylbenzene, **4**.1885
4,5,6- — -1,2,3- — , **4**.1940
Tribromtrinitrobenzene, **51**.1230
1′,4′,4′-Tribromxylene, **4**.1015
Trichloracetaldehyde, **3**.2420
Trichloracetale, **3**.2890
— (Solid), **3**.860
Trichlor-acetamide, **50**.1155
— -acetanilide, **50**.660
2,3,4-Trichloracetanilide, **50**.980
2,4,6- — , **50**.1560
Trichlor-acetchloramide, **50**.962
— -acetic Ac., **3**.480
1,1,1-Trichloracetone, **3**.2755
1,3,3- — , **3**.2765
Trichloracetonitrile, **50**.1807
$1^2,1^2$,4-Trichloracetophenone, **3**.445
Trichloraceto-o-toluide, **50**.360
Trichloracet-p- — , **50**.800
Trichloracetyl-acrylic Ac., **3**.1402
— Chloride, **3**.2495
— -pentachlorbutyric Ac., **3**.1465
Trichlor-acrylic Ac., **3**.735
— -aminobenzoic Ac., **50**.1575
2,3,5(?)-Trichlor-4-aminophenol, **50**.1267
2,4,6- — -3- — , **50**.678
Trichloranisole, **3**.550
Trichloranthracene, **3**.1680
1,2,4-Trichloranthraquinone, **3**.1885
2,3,4-Trichloraniline, **50**.385
2,4,5- — , **50**.680
2,4,6- — , **50**.475
3,4,5- — , **50**.740
2,3,4-Trichlorbenzaldehyde, **3**.955
2,4,5- — , **3**.1220
2,3,5-Trichlorbenzamide, **50**.1555
2,4,5- — , **50**.1335
1,2,3-(γ)-Trichlorbenzene, **3**.465
1,2,4-Trichlorbenzene, **3**.95
1,3,5-(s)- — , **3**.600
2,3,4-Trichlorbenzoic Ac., **3**.1370
2,3,5- — — ., **3**.1690
2,4,5- — — , **3**.1695
2,4,6- — — , **3**.1655
3,4,5- — , **3**.1985
Trichlorbenzophenone, **3**.1415
— -benzoquinone, **3**.1720
— -benzyl Chloride, **3**.3130
(β)-2,3,4-Trichlor-benzylidene Chloride, **3**.870
2,2,3- — -butanol-(1). **3**.570
α,α,β- — -butyric Ac., **3**.540
α,β,β- — — — ., **3**.440
α,α,β- — — Ald., **3**.2725
α,α,β- — — — diethylacetate, **3**.3060
Trichlor-carbazole, **50**.1445
— -chrysene, **3**.2220
1,3,4- — -cyclopentane, **3**.2865
α,β,β- — -diethyl Eth., **3**.2745
2,4,4- — -dihydronaphthenone-(1), **3**.1305
1,1,3- — -1,2- — -(2), **3**.1025
2,4,6- — -1,3-dimethylbenzene, **3**.1285
1,2,4- — -dinitrobenzene, **50**.780
1,3,5- — — , **50**.1040
3,4,6- — -2,5-dinitrotoluene, **50**.1635
4,5,6- — -dinitrotoluene, **50**.1145
1,1,1- — -ethane, **3**.2350
1,1,2- — — , **3**.2470
2,2,2- — ethanol, **3**.105
Trichlor-ethylene, **3**.2390
— -ethylidenediphenylamine, **50**.770
— -fluorene, **3**.1527
— -hydrine, **3**.2690
2,3,5-Trichlor-hydroquinone, **3**.1435
α,β,β- — -isobutyric Ac., **3**.410
2,4,6- — -isophthalic Ac., **3**.2082
Trichlor-ketohydronaphthalene, **3**.1235
— -lactic Ac., **3**.1340
(en)- — -mesitylene, **3**.2000
— -methanesulophonic Ac., **70**.330
— -methanesulphonyl Chloride, **70**.350
2,4,6(?)- — -methylaniline, **50**.70
— -methyl Chloroformate, **3**.2535
— — Chlorthioformate, **70**.270
1,1,1-Trichlor-2-methylpropanol-(2), **3**.1060
1,2,3-(α) - — -naphthalene, **3**.830
1,2,4- — — , **3**.970
1,2,5- — — , **3**.750
1,2,6- — — , **3**.1030
1,2,7- — — , **3**.915
1,2,8- — — , **3**.860
1,3,5-(γ)- — — , **3**.1125
1,3,6- — — , **3**.825
1,3,7- — — , **3**.1230
1,3,8- — — , **3**.945
1,4,5-(δ) - — — , **3**.1420
1,4,6- — — , **3**.675
1,6,7- — — , **3**.1190
2,3,6- — — , **3**.960
1,3,4- — -naphthol-(2), **3**.1685
1,4,5- — -(2), **3**.1630
Trichlor-α-naphthoquinone, **3**.2135
2,4,6-Trichlor-3-nitroaniline, **50**.725
2,3,4- — -nitrobenzene, **50**.245
2,3,6- — — , **50**.615
2,4,5- — — , **50**.265
2,4,6- — — , **50**.405
2,4,5- — -x-nitrobenzoic Ac., **50**.1620
2,3,5- — -4-nitrophenol, **50**.1190
2,4,6- — -3- — , **50**.415
2,3,4- — -nitrotoluene, **50**.285
2,4,5- — — , **50**.645
Trichloromethyl Trichloroacetate, **3**.195
3,3,4-Trichlorpentanol-(2), **3**.430
2,4,6-Trichlorphenol, **3**.655
2,3,5(?)- — , **3**.455
2,4,6-Trichlorphenyl-methyl Eth., **3**.550
Trichlorphloroglucinol, **3**.1440
1,1,1-Trichlorpropane, **3**.2625
1,1,2-Trichlorpropane, **3**.2560
1,1,3- — , **3**.2630
1,2,2- — , **3**.2530
1,2,3- — , **3**.2690
1,1,1-Trichlor-propanol-(2), **3**.420
3,3,3- — -propene-(1), **3**.2475

α-Trichlorpropylene, **3**.2485
1,2,3-(β)- — , **3**.2580
Trichlor-pyrene, **3**.2160
— -pyridine, **50**.215
— -pyrogallol, **3**.1825
— -resorcinol, **3**.855
$1',1^2 1^2$-Trichlorstyrene, **3**.3075
Trichlor-tert.-butyl Alc., **3**.1035
s- — — — — -carbinol, **3**.815
— -thymol, **3**.568
1′,1′,1′-Trichlortoluene, **3**.2970
2,1′,1′- — , **3**.3050
(v)-2,3,4- — , **3**.280
(s)-2,4,5- — , **3**.850
3,4,5- — , **3**.295
4,1′,1′- — , **3**.3070
3,4,5- — -sulphonyl Chloride, **70**.185
3,4,5-Trichlor-toluquinone-(2,5), **3**.2095
1,3,5- — -2,4,6-trinitrobenzene, **50**.1505
2,4,6-Triiod-aniline, **52**.255
1,2,4- — -benzene, **5**.270
1,1,2- — -butene-(1), **5**.80
— -m-cresol, **5**.430
1,1,1- — -ethane, **5**.345
2,4,6-Triiod-phenol, **5**.485
1,1,2- — -propene, **5**.225
1,2,3- — — , **5**.140
α- — -resorcinal, **5**.475
— -salicylic Ac., **5**.490
$1',1^2,1^2$- — -styrene, **5**.380
2,4,6- — -1,3,5-trimethylbenzene, **5**.590
Trimethyl-acetyl Chloride, **3**.3440
— -amine Chloroplatinate, **169**.615
— — +CS_2, **54**.985
— — Hydrochloride, **50**.1720
1,2,3- Trimethyl-benzene -5-sulphonamide, **54**.1640
1,3,5- — — -sulphonamide, **54**.1060
1,4,6- — — -6-sulphonamide, **54**.1435
1,3,5- — — -sulphonic Ac., **7**.420
1,2,4- — — -5-sulphonyl Chloride, **70**.110
1,3,5- — — -sulphonyl Chloride, **70**.105
2,3,3-Trimethyl-2-chlorbutane, **3**.1450
2,4,4- — -2-chlorpentane, **3**.3655
Trimethylene Bromide, **4**.4140
— Dimercaptan, **7**.1625
— Disulphide, **7**.350
— -imine Chloroplatinate, **169**.270
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2,3,4- — pyridine Chloroaurate, **161**.70
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1,2,4- — -pyrrolidine Chloroplatinate, **169**.130
2,3,5- — — — , **169**.325
1,2,4- — -5-sulphinic Ac., **7**.675
1,3,5- — -2- — — , **7**.585
1,2,4- — -thiophenol-(5) , **7**.520
1,3,5- — — -(2), **7**.1860
1,3,5-Trinitrobenzene-2-sulphonic Ac., **54**.575
2,4,6-Trinitrothiophenol, **54**.770
Trional, **7**.410
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— -chlormethane, **3**.1200
α- — -guanidine Hydrochloride, **50**.1685
— -guanylthiourea, **54**.1160
— -iodmethane, **5**.455
— -thioammelin, **54**.1825
— -thiourea, **54**.1170
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β- — — , **7**.825
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— -acetophenone, **7**.775
— -anisic Ald., **7**.840
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(α)- — -cinnamic Ac., **7**.1080
(β) — — Ald., **7**.1195
— -dilactylic Ac., **7**.575
— -formaldehyde, **7**.1215
α- — -furfurol, **7**.860
β- — — , **7**.1225
β- — -4-hydroxybenzaldehyde, **7**.1205
β- — -piperonal, **7**.1235
α- — — , **7**.1145
β- — -salicylic Ald., **7**.1190
— -vanillin, **7**.1230
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Tropane Chloroplatinate, **169**.465
Tropidine Chloroaurate, **161**.260
Tropine Chloroaurate, **161**.275

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Undecylenic Acid Dibromide, **4**.225
Urochloralic Ac., **3**.1490

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n-Valeryl Chloride, **3**.3550
Vellosine Chloroplatinate, **169**.55
"Vifferal," **3**.1600
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— Chloride, **3**.3205
— Iodide, **5**.710
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o-Xylyl Bromide, **4**.4820
o- — Chloride, **3**.3945

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